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CREATIVE MIND

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by

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To

MY MOTHER

GENERAL INTRODUCTION

The Contemporary Library of Psychology has been planned to meet what is felt to be a need alike of the student and of the large and growing public who take a keen and intelligent interest in the subject. In common with all other sciences, Psychology is continually enlarging its boundaries by the discovery of fresh facts, the construction of hypotheses to explain them, and the verification of the hypotheses in experimental conditions. Unlike those of the other sciences, however, the claim of which to acceptance has long been established, its principal achievements are of comparatively recent origin. No doubt many of its problems are as old as philosophy itself; but their ancient solutions were of a highly speculative character, and it is only since the application of scientific method to the data of mental life that it has been possible for Psychology to take its place within the ranks of the empirical and experimental sciences.

Its scientific progress, however, has since then been astonishingly rapid; so rapid, indeed, that it has not failed to be accompanied by certain dangers incidental to speedy growth from infancy to adolescence. There have been the dangers, not always successfully avoided, of non-observation and of mal-observation, of hasty generalisation from

insufficient data, of immature and faulty method, of imperfect experimental technique, and the like.

Even now, when all these have in large measure been overcome, and an incomparable method devised by which psychological data may be treated mathematically, there are still numbers of divergent schools each claiming to be the sole genuine representative of the science. This is in the main, if not entirely, due to the fact that workers have laboured more or less independently in separate and even isolated areas within the psychological domain. Some have specialised in the abnormalities of mind, and from their clinical observations have derived a general theory which they then extended to cover mentality as a whole. In this general theory the emphasis is upon the emotional character of mental life, and especially upon the dynamic nature of the Unconscious. Others, interested in animal and human behaviour rather than in the mental processes themselves, have found consciousness a superfluity for purposes of explanation, and have stressed a few native reaction-patterns as the basis upon which all behaviour is built up. Others, again, have occupied themselves with mental processes as these are actually observed to occur, and have devised experimental means for their investigation. And so on.

A consequence of this divergence of interest, especially when the several views to which it leads are expounded in

text-books and manuals, and above all in summary expositions intended for more popular consumption, is that the reader is apt to form a one-sided and entirely misleading conception of Psychology. He may become an ardent psycho-analyst, a keen behaviourist, a formalist, a purist, or what not, as the case may be. But, while there is no doubt much truth in all these systems, which in point of fact considerably supplement one another, there is still in most of them a great deal that is of the nature of assumption and over-generalisation. The literature, moreover, of late years has grown to such an enormous extent that it is almost impossible for any one person to master it, and so to gain for himself a comprehensive and accurate perspective of contemporary Psychology in so far as this science is definitely and systematically established.

The plan of The Contemporary Library of Psychology has been drawn up with a view to presenting such a perspective in a popular way, but at the same time without any loss of scientific accuracy. Each volume to be included in it will deal with a special and definite topic which is capable of independent treatment as a single chapter of Psychology. Though this plan inevitably entails a certain amount of overlapping, since no one volume will take for granted what has been set forth in another, and certain principles are of necessity common to all, overlapping will be restricted to a

minimum. The Series will, it is hoped, embrace all the major topics of the science, including those of Comparative, Ab-Normal and Applied Psychology. In this way each volume will be complete in itself; while the Library as a whole will cover the entire field of Psychology.

With this aim in view, it is confidently hoped that it will prove to be of real service both to the student and to the general reader.

F. A.

ACKNOWLEDGMENTS

Not only for the stimulus to undertake this work, but also for manifold services in carrying it out, my cordial thanks are hereby tendered to the Editor of the present Series. A pleasant debt must also be admitted to much judicious counsel from Dr Ballard; his help has been particularly valuable with respect to painting, of which he is a known master. With especial respect to music, but in other directions also, I am grateful for assistance from Mr Hargreaves. Several helpful literary comments I owe to Mrs Stewart. The Index is an appreciated contribution of Miss Griffiths.

To the Publisher I have to acknowledge generous support in furnishing this work with its numerous illustrations. In respect of these, I have to express my thanks for permission to reproduce the originals: to the Birmingham Art Gallery Committee for Plate II; to Messrs Putnam's Sons for Plates VII and VIII from Professor Raymond's book, *The Essentials of Aesthetics*; to the Proprietors of *Punch* for Plate X; to Messrs Tootal, Broadhurst Lee & Co., Ltd, for Plate XII; to Mr Julius Springer of Berlin and Dr Kerschensteiner for Plate XIII; to Mr W. E. Hill and the Editor of the *American Journal of Psychology* for Plate XVI; and to Dr J. Cox for Figure 6; as well as for kind assistance in respect of some of these illustrations to Mr Frank Rutter, on whose *Evolution in Modern Art* I have drawn, and to his publishers, Messrs G. G. Harrap & Co.,

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C. S.

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CREATIVE MIND

CHAPTER I

THE PROBLEM

¶ 1. REALM OF CREATION. "Creative Mind"! These are big words. Rendered into the Greek language, they become "Nous Poetikos", that great mystery conceived by Aristotle. The passive mind, he writes, is potentially all things; but the creative mind is that which converts the potential things into the actual things, as light turns potential colour into actual colour.

In our mother-tongue, too, is not the very highest of titles we can bestow that of "The Creator"? And He Himself is taken to be a Spirit or Mind; therefore, the Creative Mind. But as so used, the term "creating" has a more general sense than was intended by Aristotle; it means the bringing into existence of that which did not ever exist previously; it signifies much the same as originating, generating, producing, making, and the like. In such a general sense will be taken the creation that concerns us here. But for our part, we shall venture no Icarus-like soaring up to the dizzy heights of the divine. Our topic—though perhaps not without eventual bearings on sublimer regions also—will for the present run its course on the lower plane of humanity. Not to the Supreme Being will we dare to raise our eyes, but only to Man made in the likeness thereof.

Even on this lower plane, what a throng of great deeds and persons come crowding round us at the words! Foremost, the mighty creations of poetry and the other fine arts; of Homer, Dante, Shakespeare and Goethe; of Phidias, Da Vinci, Raphael, and Beethoven. The very word "poet" expresses in Greek what "creator" does in Latin; that is to say, "he who makes".

Still loftier perhaps, though more in the background, loom the achievements of physical science; the theories that interpret the universe as we know it; the mental flights of an Archimedes, a Galileo, a Newton, a Schwann, a Pasteur, an Einstein. And even those good folk for whom such theories remain a closed volume can at any rate appreciate their material realisations; the wonders of transportation by land, air, and sea; the marvels of communication, with or without wires; the colossal structures, as bridges, skyscrapers, and engines of military destruction; the still greater prodigies on a microscopic scale, as revealed in the magical transformations of chemistry and physiology.

But if the physical sciences be deemed creative, why not the mental ones also? Think, for example, of social organisation. Take any modern nation numbering its millions. Consider all its constructions at manifold levels and along multifarious lines; commercial, judicial, religious, disciplinary, industrial, recreative, hygienic, political, artistic, investigational, criminal, and so forth almost without end. Can we withhold the merit of creativity from our law-givers and our statesmen?

More exalted still than either physical or mental science

towers the sphere of philosophy. For here are mentally created, not merely such fragments of the world as material objects and social institutions, but whole new worlds! Let us, then, acclaim as pre-eminent originators Anaxagoras, Plato, Aristotle, Descartes, Spinoza, Berkeley, Kant, Hegel, and their compeers, East as well as West.

But this reference to philosophy suggests that the creativeness of a thought does not depend on its being truthful, or even reasonable. On the contrary, a case might be made out for maintaining that, whilst such mental content as is true *may* be created, such as is false *must* be so. For how else could it ever come into being? But hereby hangs a tale which for the moment we may let hang. Undeniable at any rate is it that falsities—for example, dreams (sleeping or waking)—may be called creative in just as pregnant a sense of the word as are the deliverances of poets.

Yet another type of mental creation is that which plans out conduct. Before anyone can behave—if we exclude from this term the mere unpurposive contracture of his muscles—he must needs construct some idea of what he is going to do. Accordingly, we all attribute creativeness to the strategic schemes of a Hannibal, or of a Napoleon; to the political designs of a Cavour, or of a Lincoln.

With all these instances, of course, the domain of mental creation is not exhaustively catalogued but only here and there illustrated. Many further examples will be found on the following pages, and others to unlimited number will readily be remembered by the reader for himself.

¶ 2. THE TWO POLICIES. In approaching this great realm of mental creativity, one is embarrassed to find that there may be adopted either of two very different policies. The one consists in surrender to the emotional excitement which such an exalted theme is apt to inspire; this course leads to enthusiasm and panegyrics; it is easy to achieve, wins favour from almost everyone, and warms the writer with moral complacency. The contrary attitude is that of cold-blooded investigation. It would take the creative faculties to pieces, in order to find out the trick of them. Such a course as this, besides entailing arduous work, surely brings to the hapless investigator more kicks than ha'pence. As a great artist, Stevenson, once wrote:

"There is nothing more disenchanting to man than to be shown the springs and mechanism of any art. All our arts and occupations lie wholly on the surface; it is on the surface that we perceive their beauty, fitness, and significance; and to pry below is to be appalled by their emptiness and shocked by the coarseness of the strings and pulleys."

Later on, however, the same writer himself salves the poor prying spirit with some words of comfort:

"Those disclosures which seem fatal to the dignity of art seem so perhaps only in the proportion of our ignorance; and those conscious and unconscious artifices which it seems unworthy of the serious artist to employ were yet, if we had the power to trace them to their springs, indications of a delicacy of the sense finer than we conceive, and hints of ancient harmonies in nature."

For my own part, at any rate, I will frankly confess, here and now, that just the "springs and mechanisms" are the

object of the present pursuit. In the end, a better understanding of how great works are created does not abate our sense of their greatness but only enhances it. Look at the artists themselves! Are they not day and night talking and thinking about their "springs and mechanisms" without thereby incurring the least abatement of their artistry!

Why they so concern themselves with the machinery is, of course, because they desire to gain more perfect mastery over it. And this is what all science is really aiming at. If it so persistently analyses things into last elements and reduces events to ultimate laws, all such activity is by no means disinterested and solely for its own sake. The quarry it hunts is not theoretical alone, but in still higher degree practical. If it seeks to understand how things are going on now, it does so in order to foresee what they will be doing presently, thereby bringing their course under direction and control. And just this is our policy here. If ever we should succeed in prying out any secrets as to how the mind achieves its creativeness, it will be in the hope that such a better understanding may aid us to appreciate and to create the more effectively.

CHAPTER II

CURRENT DOCTRINES

¶ 1. ACCEPTANCE AS ULTIMATE FACT. But before adventuring our own inquiry into the creative power, we may perhaps usefully glance at the chief attempts which are current already.[1]

One doctrine that has obtained much vogue is not so much an explanation as rather a refusal to explain. The power to create is simply accepted as an ultimate fact.

On such a view, curiously, it is often limited to "genius". Thus Ravaisson writes: "Genius, by the admission of everyone, consists above all in inventing, in creating". So too Gerard: "Genius is properly the faculty of invention; by means of which a man is qualified for making new discoveries in science or for producing original works of art". Both these authors are quoted with approval by Ward,[2] who speaks of creativity as something "that only transcendent genius displays". He adds the curious declaration that this creative genius is innate, but nevertheless not inherited! He writes that "It pertains to the subject, not to his psychoplasm, as his talents do".

Now, in thus taking creativity to be itself the last word of explanation, there is nothing necessarily wrong. Some word must be the last, any way. But we are scarcely entitled

[1] Should this all too curt reference to current doctrines prove difficult to those who are unfamiliar with them, the chapter may be omitted without hurt to the rest of the book.

[2] *Psychological Principles*, 1918.

to such a renunciation of all better understanding until we have at least made every feasible effort to obtain it. And as for the asserted limitation of creative power to "genius", as also the bizarre statement about heredity, we cannot expect such declarations to be adopted until at any rate they are backed up by definite evidence.

¶ 2. EXPLANATION BY IMAGERY. Passing on to the explanations that have been attempted, the most ancient of them—and perhaps the one which still enjoys the widest favour—is that which resolves creation into "constructive imagination". To this it is that most writers are wont to credit the visions conjured up by the fine frenzy of the poet, the marvels evolved by the great scientist, the Utopias bodied forth by the social reformer, and even the dazzling sallies of the wit.

Upon this "imagination", accordingly, authoritative persons of all kinds—from great ministers of state patronising universities down to literary hacks at loss for a theme in the slack season—have lavished their most eloquent praises. Thus Stewart writes:

"The faculty of imagination is the great spring of human activity, and the principal source of human improvement.... Destroy this faculty, and the condition of man will become as stationary as that of the brutes."[1]

Often it is painted in even more glowing colours:

"That wonderful faculty—the source of poetic genius—the instrument of discovery....It is the creative power of

[1] *Philosophy of the Human Mind.*

the mind which lights up all work, which gives life and meaning to it at every stage, and gave it birth in the beginning."[1]

Goschen, a very notable Chancellor of the Exchequer, finds in such laudation the opportunity for a sly thrust at his political opponents—

"Often you find in men an absolute incapacity to realise an unfamiliar situation, to grasp conditions which are not immediately visible, to recognise facts which to others are a plain and patent element in their lives. That incapacity springs from a dull and uncultivated imagination.... A House of Parliament without imagination is a dangerous House."[2]

Now the word "imagination" originally meant—and by its very structure cannot help implying still—the usage of mental "images," visual, auditory, or otherwise. These in psychology mean the sort of mental pictures examined by Galton.[3] He sent round the following questionnaire: "Think of some definite object; suppose it is your breakfast-table as you sat down to it this morning—and consider carefully the picture that rises before your mind's eye".

In reply, some individuals wrote that their mental imagery was extremely vivid. "Brightness is as in the actual scene." "I can see my breakfast-table or any equally familiar thing with my mind's eye quite as well in all particulars as I can do if the reality is before me."

But other individuals answered very differently. With

[1] M. Macmillan, *Education Through the Imagination.*
[2] Speech to the University of Liverpool.
[3] *Inquiries into Human Faculty.*

many, the vividness of the imagery was only mediocre. They wrote back, for instance: "Fairly clear, but brightness not comparable to that of the actual scene." "Fairly clear as a general image; details rather misty."

And with a not inconsiderable number, at the bottom of the scale, the imagery degenerated to the point of total disappearance. Such reports were made as the following:

"Usually very dim. I cannot speak of its brightness, but only of its faintness." "My powers are zero. . . . I recollect the breakfast-table, but do not see it." "It is only by a figure of speech that I can describe my recollection of a scene as a mental image, which I can 'see' with my 'mind's eye'. . . . I do not see it any more than a man sees the thousand lines of Sophocles which under due pressure he is ready to repeat. The memory possesses it."

But here it might appear that—did they but realise it—the psychologists of whom we are speaking have arrived at a position both wonderful and fearful. For theirs surely must be the task to separate off those persons who possess the images—by which, it is said, creation is effected—from those who do not possess them. Theirs must be the responsibility to select those who have in their hands the wherewithal to improve mankind, light up all work, and pour forth poetry, from those whose rôle is only to endure these things. Upon them must devolve even the picking of those who are fit for seats at St Stephen's, from among those who were better kept out of such harm's way. And all this they will do simply by asking people what rises in their minds when they think of their breakfast table.

For this prospective millennium, however, experimental work has proved discouraging. Comparisons have now been made in many kinds of mental performances between the persons who are endowed with such images and those who are unendowed. In not one single kind of performance, so far, have the imageful persons shown any superiority over the imageless.

Indeed, the persons who possess images of great vividness seem after all not to make much genuine usage of them. An artist replied to Galton that, though he had formerly supposed himself to paint by means of his images, he now found himself not really able to do so. He continued:

"There is perhaps some analogy between these images and those of 'faces in the fire'. One may often fancy an exceedingly well-marked face or other object in the burning coals, but probably everybody will find, as I have done, that it is impossible to draw it, for as soon as its outlines are seriously studied, the fancy flies away."

In the present state of evidence, then, this doctrine of creation by means of images may be dismissed from further serious notice.[1]

¶ 3. EXPLANATION BY COMBINATION. Either allied with the preceding explanation by images, or else divorced from it, there has been from the most ancient times a dominant tendency among psychological authorities to explain creativity by "combination". According to this doctrine, when we

[1] For the experimental work, see particularly that of Aveling, Bühler, Carey, Martin, and T. Moore; also a luminous chapter on "Imagination" by Ballard, *The Changing School*, 1925.

regard a mental product—be it picture, poem, invention or otherwise—none of its constituents are new in themselves; new only is the fact of their now keeping company.

But at bottom, this doctrine appears not so much to explain creations, as rather to miss finding them. Suppose, for example, I see a man, at one time climbing a tree, and at another eating his dinner. And suppose further, as is natural enough, that the second encounter recalls to me the first. I now have in my consciousness both the tree and the dinner; and this, by hypothesis, is a brand new combination (it is so equally, whether it consists of images or of ideas). But there is nothing whatever about it comparable with the achievements cited in our first chapter; nothing which seems to merit the title of "creative" at all: nothing, then, that can render us any service in our present quest.

¶ 4. EXPLANATION BY "FORM" (OR "GESTALT"). Gaining so little satisfaction from the orthodox doctrines which have been handed down by ancient psychological tradition, we may the more expectantly turn to the three modern schools of thought which are at present fighting a droll triangular duel for the title of "The New Psychology".

Most promising of these (for our purposes) might seem to be the school of "Form" or, in German, "Gestalt". For this, at any rate as represented in the earlier "Austrian" way, did try to show what it called mental "production", a word that suggests creation. It maintained, for instance, that when a person appreciates a melody, he first hears the notes and then, by a further act, "produces" in his mind the musical

Gestalt or form. But even this analysis evidently falls far short of what we need. For production in the sense of creation does not lie merely in appreciating melodies, but rather in composing them. And about the latter achievement this school appears to offer no assistance.

¶ 5. REJECTION BY BEHAVIOURISM. The second participant in the triangular rivalry is the school of Behaviourism. But so far is *this* from explaining any mental creativity, that its express slogan—that which alone holds together its otherwise strangely assorted champions—consists in demanding that the very concept of "mental" should be expunged from psychology, reducing this to a bare account of physical stimulation and motor response!

¶ 6. PSYCHO-ANALYSIS. With this third claimant to be The New Psychology, the part played by mental events, far from being eliminated, receives a vast extension; to the territory of consciousness is added on the boundless depth of the "subconscious" mind; and herein is found to revel and riot all that is most fantastic. Prodigious is the crop of similes, metonyms and synedoches, not to mention innuendoes, euphemisms, litotes, and transferred epithets; in fact, all the graces of conscious poetry, now redoubled in the service of subconscious bestiality. But as to how such feats are possible; as to the mental laws by which either poet or beast is able to conjure up his amazing tropes; about all this the psycho-analysts show little interest. Absorbed as they are in hunting down the origin of motives, they lend us but scant help in searching out the creation of ideas.

CHAPTER III

QUALITATIVE PRINCIPLES OF KNOWING

¶ 1. THE REQUIRED PRINCIPLES. The upshot of our search for existing explanations of creativity has been disappointing. And so, not getting forward by the efforts of others, there seems no way out but to put our own shoulders to the wheel and try to explain the matter for ourselves.

But what is "to explain"? Much might be said about this term, which we utter so glibly. In its literal sense, it means to spread out and flatten; metaphorically, it is to make plain or clear. But this achievement possesses, so to speak, value in two dimensions, the perfective and the extensive. By the former is meant that, since a thing is explained by being identified with something else known already, the better this is known the more perfect the explanation. Thus, where a rock is ascertained to consist of dolomite, this explanation is especially effective for the mountaineer who has travelled in the Carinthian Alps, or for the builder who has used the stone for building purposes. The second or extensive value of an explanation depends on its generality; it is the better, that means, as the thing to be explained is identified with things of wider and wider extent. And such an increase of scope derives from submitting the things concerned to finer and finer analysis. Suppose that the dolomite were analysed out into a double carbonate of calcium and magnesium; this fact would bring it under the light of all that chemistry knows on the very extensive subjects of carbon, calcium and

magnesium. Yet a third requisite in explanations—leading naturally out of the second—is that they should collectively make up a complete system. So long as a science knows only a fraction of the influences at work anywhere, it is almost as likely to lead astray as aright.

From all this we may gain a better idea of the kind of explanation that is *required*. The creativity should be traced down, not to processes or laws of any novel and wonderful kind, but on the contrary to those which are most familiar and most self-evident. Again, these processes or laws should be ultimate, so as to have the widest possible extent; the laws should not be deducible from any others more general, nor should the processes be divisible into others more minute. In fact, this is just what the word "principle" (from the Latin *principium*, a beginning) really signifies. Furthermore —and hardest of all to accomplish—the laws or processes should together constitute a complete set. The great exemplar of satisfying these three explanatory needs is supplied by Newton's laws of motion, of which the first runs as follows: "Every body perseveres in its state of rest, or of uniform motion in a straight line, except in so far as it is compelled by forces to change that state".

Here a critic might hastily declare that such a law he could see for himself, without any Newton to tell him. But this is just what Newton wanted; to express events in terms that the critic *could* understand. The ideal of science is indeed wonderfulness of results, but always based on simplicity of means.

¶ 2. PRINCIPLE OF EXPERIENCE. Let us now bring all this to bear on our present problem. The task of explaining mental creativity has become that of finding for it a place among the basal and ultimate powers of knowing; or, as it is technically designated, of "cognition". These powers have recently been enunciated. They are three in number. The first has been called the Principle of Apprehension of Experience. For our present purposes, this may be formulated as follows—"*A person tends to know his own sensations, feelings, and strivings*".[1]

It should be noted that this principle expresses simultaneously both a law and a process. And the same will be found true of the two other qualitative principles; but *not* of the subsequent quantitative ones.

As suggested in the preceding considerations, many who hear this principle may at once think, What a platitude! For my part, I could only desire that it were more so. As a matter of fact, simple as it undeniably is, and exactly true as I believe it to be, it nevertheless stirs up some of the most difficult problems and obstinate controversies that have vexed psychologists and philosophers from the earliest recorded times. These troubles have largely been connected with the concepts of "inner sense" and "consciousness". Such powers have had more vicissitudes of repute and valuation than befall stocks and shares in the finance market.

Nevertheless, though not going so far as to say that all

[1] A more exact formula given by the present author is: "Any lived experience tends to evoke immediately a knowing of its own characters and experiencer". *Nature of Intelligence*, 2nd ed. 1927, p. 48.

this has been much ado about nothing, the suggestion may be ventured that the ado has been over-done. This is perhaps one of the occasions where the greatest authorities have tied themselves up in the tightest knots, ending in a worse plight even than that of plain common sense.

The facts really at issue may be illustrated by such familiar sayings as "I see this", "I remember that", "Such and such a thing displeases me", "It is not my intention". A man will even, upon occasion, avouch such statements with the most solemn oaths. But what he is affirming is nothing more than his own experiences; his perceptions, thoughts, feelings, and volitions. Such experiences, then, by universal admission, do enter into the awareness of the experiencer.

One difficulty that seems to need a word or two here comes from sensory perception, especially visual. Expressed as in ordinary parlance, I at this moment see before me a shilling. Do I really see it? The study of hallucinations proves beyond doubt that I could possibly have an experience exactly like the present one, although there might in truth be no shilling there. An inevitable conclusion is that the experience in itself does not include the real existence of the shilling, but solely the mental act of perceiving it. And so with all other sensory perceptions. However true really, they are as experiences nothing more than mental acts or states.

The question now arises: How do such complex sensory percepts as that of a shilling stand with reference to the more elementary experiences commonly called bare "sensation"? In answer we may say that the latter provides most, though not all, of the original material out of which the

complex percepts are constituted. As to the way in which this constitution is achieved, we shall see more in chapter XI. For the present it must suffice to outline the whole domain of the sensations by recording that they possess four and only four primary characters: quality, intensity, place and time. As to range of the quality, the tactile sense would seem to possess only four kinds, pressure, warmth, cold and pain. Taste also has four, sweet, salt, sour and bitter. The visceral sensations have perhaps a dozen appreciable grades. Smell, on the other hand, has been credited with about 500 grades. Sound is divided into noise and tone, the grades of the former numbering some 600; those of the latter, not less than 10,000. Sight separates into chromatic and achromatic, the former having perhaps 200 grades, but the latter only two, namely, black and white. Thus, the grand total may be taken at roundly 12,000.

Passing on to the second general character, that of *intensity*, there appear to be about 700 distinguishable grades of brightness, but only about 100 of loudness.

As for the two remaining characters, those of *space* and *time*, their range of variation is for the present purposes sufficiently obvious. Such, then, is the entire gamut of the sentient characters.

On the whole, we are now sufficiently prepared to cope with this first law and process in so far as concerns our main task. This is, to decide how far and in what significance their action can be accepted as "creative". When, for example, one feels a pain, knows it, and thereby acquires the idea of it, can this idea rightly claim to be something created?

We may reply that the pain does create the idea in the sense of producing it; but not in the sense of inventing it. Otherwise expressed, the knowledge has no genuine originality, since it does no more than imitate what was already existent. If we entitle it creative at all, we must add that it is so only in the lowest degree.

¶ 3. PRINCIPLE OF RELATIONS. Let us pass on, then, to the second principle, formulating it approximately as follows:

When two or more items (percepts or ideas) are given, a person may perceive them to be in various ways related; thus, one may be near, after, the cause of, or a part of, the other.[1]

The items which are related may conveniently be termed the "fundaments" of the relation. Here again, we have facts that might seem only too obvious; so much so, as not to be worth the saying. And indeed the great majority of psychologists appear to have put some such view into their actual practice. They have brought forth tome after tome about mental happenings and have left out the perceiving of relations because it happens too often! Surely, this is the very archetype of not seeing the wood for trees.

For all its seeming triviality, however, even this principle of relations presents many a problem that is thorny enough. And some sharp pricks from them we shall hardly manage to escape even in our present account.

Passing them over for the present, however, we may get

[1] More accurately, "the presenting of any two or more characters (simple or complex) tends to evoke immediately a knowing of relations between them," see p. 63 of the work quoted here on p. 15.

some notion of the total scope of this principle by briefly enumerating, with examples, the different classes into which the relations have been divided. They fall into two general types, "ideal" and "real", of which we will take first the former. This itself splits into three classes. One is supplied by the ubiquitous relation of *likeness*, including all its kinds and degrees. Without the power to perceive this relation, a person could recognise nothing and conceive nothing; he would be mentally and even physically paralysed. Next comes the relation of *evidence*; it is that whereby we know, for instance, that the premisses of any syllogism warrant its conclusion. Upon this relation depends the whole length and breadth of human reasoning. Last comes the *conjunctive* relation. It is that which is signified by the little word "and". Despite its seeming simplicity, it appears to be responsible for the whole of arithmetic.

Turning to the "real" relations, these include seven classes. One is that of *attribution*; it exists when we can appropriately say that one thing is an attribute of another; as "hard" is of "diamond", "yellow" is of "lemon", and so forth. Every school child has to become familiar with attributes under the name of "adjectives". The second class presents far more difficulty; in fact, it has worried philosophers so greatly, that some have denied its being really a relation at all. It consists in *identity*. It holds between any two things that can be called the "same"; for instance, oneself at one moment and at the next. As the third class we may cite the relation of *time*. When one notices that lightning precedes thunder, one is perceiving a temporal relation

between them. Next comes naturally the class deriving from *space*; if anything is perceived to be higher, lower, larger, or smaller, than another, it is to this class that the perceiving must be assigned. Next may be put the relation of *cause*. It is that which holds, or is supposed to hold, between the blow of the bat and the flight of the ball, or between the hearing of good news and the rejoicing at it. The sixth real relation is peculiarly hard to understand. For want of a better name, it may be called the "*psychic*" relation, since it is the prerogative of mind. It has also been called the relation of "*objectivity*", since it is that which holds between a mental process and its object, between seeing and what is seen, thinking and what is thought about, desiring and what is desired. The seventh and last class of relation has been named that of "*constitution*". It has the distinction of having been rarely if ever detected; although really, it is the commonest of all, for it occurs wherever any of the others do. It is simply that which holds between constituents and what they constitute; that, for instance, which bread and meat hold to a sandwich, or redness and squareness to a red square.

Such, then, is the whole armoury of relations at the disposal of the human mind. It is a subject on which one is tempted to expatiate. Restraining ourselves, we will here only touch on a few points that might otherwise be likely to cause confusion.

One is that relations may be arranged either randomly, or systematically. The former case is exemplified by pebbles on the seashore; the latter by the pearls of a necklace. Or again,

the random relations are shown by bricks dumped on the ground; the systematic ones, by these same bricks when built up into a house. Now, a systematic arrangement of relations is called by such names as a "form", "pattern", "configuration" and the like. It is the main meaning also of that very equivocal and controversial German word "Gestalt". A special case of systematic arrangement is furnished by a continuum; for example, an even wash of paint, or one getting uniformly darker in one direction.

Besides this diversity between random and systematic relations, there is another one that has given rise to much misunderstanding. It consists in this, that the perceiving of a relation may be done either in two steps or in only one. Suppose, for example, that several cards are exposed to view on a table and that five of them happen to be neighbouring values of the same suit. Some spectators, although they look at every single card (including the five), might fail to notice the fact of the sequence till some time afterwards. In this way the whole operation would fall into two easily distinguishable steps: first, the five cards are seen one by one; and then they are mentally combined. But other spectators might behave otherwise; they might apparently see the five cards as a sequence from the very beginning; they would be more likely to do this if they were habitual poker-players, or if the cards chanced to lie side by side. This time only one step would be manifest. A curious scrutiny of these two modes of operation, by one and by two steps respectively, arouses many points of interest, and even of difficulty. For instance, which of

the two modes is "synthetic" and which "analytic"? And in what respect? But for our present purposes it is sufficient to note with great care that under our principle of perceiving relations, we include *both* modes.

Just another detail seems to need remark. When we talk of perceiving relations we incline to mean doing so in the focus of our attention. But really by far the greater part of our perceiving goes on marginally. I not only see some item upon which I am intent but also, more obscurely, a great many further items. The same applies to perception through the other senses, and no less so to thinking.

There remains to consider our main theme. How far may this second principle of perceiving relations be regarded as creative? In answer, we must concede that much of its achievement falls under the same objection as was raised to the first principle; it only copies what was already existing; thus in our example of the cards, the sequence really existed before ever it was detected. But possibly other cases of the principle do not fall under this objection. Some people have even held that none of the "ideal" relations have any real existence at all (indeed, this is the very reason that they are distinguished by the name of "ideal"). If so, we seem forced to admit that they are created by the mind. However, on this point we may be allowed to compromise by allowing the principle of relations to be creative in the *second* degree.

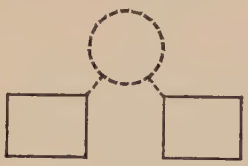
¶ 4. PRINCIPLE OF CORRELATES. We push on, then, to the third principle. Roughly expressed, this runs as follows:

"*When any item and a relation to it are present to mind, then the mind can generate in itself another item so related*".[1]

All three principles can be symbolised and compared by means of the following figures:

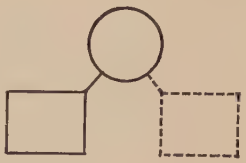
Principle of experience

Fig. 1.



Principle of relations

Fig. 2.



Principle of correlates

Fig. 3.

In Fig. 1, the black rectangle represents the initially lived experience, whilst the outlined square is the (more or less incomplete) apprehension of this experience. In Figs. 2 and 3, the circles represent relations, and the rectangles are their fundaments, whilst the lines joining the circles and the rectangles together indicate their "coherence".[2] In both Figs. 2 and 3, the lines are continuous for everything that is given initially, but dotted for that which is generated by means of the process.

To obtain an instance of the third principle, nothing more is needed than to look at a triangle and try to picture how it would appear upside down. The actuality and ease of the

[1] More exactly, the principle is: "The presenting of any character together with any relation or relative character tends to evoke immediately a knowing of the correlative character".

[2] See p. 58 of the work quoted here on p. 15.

process are palpable. Given here originally were the triangle and the relation of upside-downness. From these was generated the correlative triangle-upside-down. As another example rap out some well-marked rhythm and ask anyone to beat it about twice as fast. This time the given item or fundament is the slower rhythm, whilst the given relation is that of "twice-as-fast"; the generated item or correlative fundament—the "correlate"—is the faster rhythm. A third example may be picked from the region of thought, and nothing hardly could be simpler than the famous test of "Opposites". Words are read aloud, and to each of them the subject has to respond with its opposite. Thus "good", "tall", "clumsy", will be answered with "bad", "short", and "dexterous". Here, the word read out provides the given idea, whilst "opposite" indicates the given relation. The evoked and correlative idea, or the "correlate", is, of course, the response.

Yet another example may be quoted here on account of its historical interest. It is supplied by Hume, whose whole doctrine was the very antithesis to anything of the nature of mental creativity. In his view, man's power of knowing was a very simple affair; originally came the mental impressions made by the sensory stimuli; then followed more or less faint reproductions of these mental impressions; and with these two processes—impressions and reproductions—the whole business of perceiving and thinking was taken to be analysed and described from A to Z. Unfortunately for the completeness of his satisfaction with this result, a case occurred to him which made an obstinate exception; here,

the mind seemed, even to him, to arrive at something *more* than a mere reproduction of sensory impressions. He wrote:

"Suppose a person to have enjoyed his sight for thirty years, and to have become perfectly well acquainted with colours of all kinds, excepting one particular shade of blue.... Let all the different shades of colour, except that single one, be placed before him, descending gradually from the deepest to the lightest....Now I ask, whether it is possible for him, from his own imagination, to supply this deficiency? I believe that there are few but will be of opinion that he can".[1]

For his doctrine, this admission was most awkward. However, he lightly disposed of the whole matter with the remark, "The instance is so particular and singular, that 'tis scarce worth our observing".

Now, far from conceding the case to be so "singular", we may confidently declare it to be nothing more than another instance of the third ultimate principle of the mind, the educing of correlates. Let us check it piece by piece. What is here the needed given item or fundament? Evidently, the aggregate of all the different shades of blue excluding the "particular" one which had been missing in previous experience. What is the needed given relation? Obviously, that of intervening between the darker and the lighter of the given shades. And what, then, is the item to be evoked, the one that stands in the given relation to the given item? Obviously, this too is duly here; it is the required "particular shade".

There is a note which may usefully be appended to this account of the process of generating correlates, although at first sight it may seem rather meticulous. For later on the

[1] *Treatise of Human Nature*, 1739.

point might give rise to serious misunderstanding. This is that the relation involved in this process is rarely if ever a perfectly isolated one. It comes rather as an element, the sole *indispensable* element, in something that is relative. Suppose, for instance, that a person is asked to draw a perpendicular to a given line. Here, a perpendicular is not strictly speaking a "relation", but it is certainly something relative; it includes as a constituent the relation of perpendicularity. Even when asked to give the "opposite", this word really means not the bare relation of oppositeness, but rather the attribute which has this relation.[1]

We have now arrived at our crucial question once more. Is this third principle creative, or does it suffer from the limitations of the other two?[2] The whole course of events, wherein this principle supplies the final act, is as follows. On some previous occasion a and b have been known to possess the relation r. Thereafter, by transferring r to a' which is different from a, the mind can evoke b' which is not only different from b, but appears capable of transcending all existence, known, real, or even possible. In short, then, this third principle would seem entitled to be recognised as creative in the *third degree*. And the proposition is here ventured with some confidence that *this degree of creativeness is the utmost to which the human mind can under any conditions possibly attain.*

[1] From this standpoint, there is no need to introduce a second type of correlate eduction, as was done by me previously. *Cf.* p. 103 of the work quoted here on p. 15.

[2] For comparison of the three, see the diagrams on p. 23.

CHAPTER IV

QUANTITATIVE PRINCIPLES

¶ 1. QUANTITATIVE LAWS. A feature apt to be surprising in the three qualitative principles just formulated is that they expressly limit themselves to indicating "tendencies". How should these help us until we hear the conditions under which they become actual facts? Or, what amounts to much the same thing, the complaint may be urged that the mission of science cannot be fulfilled by laws that deal with quality alone; it indispensably demands also quantity.

The excuse—and, it would seem, a good one—is nothing more than that of convenience. For various reasons, the principles of knowing can most conveniently be expressed in two separate sets of laws, one dealing with quality and the other with quantity. Having considered the former, we will now turn to the latter.

But what is "quantity" in respect of knowing; "cognitive quantity", as we may call it? The best reply would seem to be that the quantity of any cognitive output may be regarded as proportioned to its clearness, complexity and speed.[1]

With the aid of this concept of quantity, we may proceed to enunciate the first quantitative law. It is to the effect that *every mind can be regarded as keeping its total output constant in quantity, however varying in quality*. This law, of course, must always be taken in combination with the others.

[1] *Cf.* Spearman, *The Abilities of Man*, Macmillan, chap. XIV.

Any actual event can only be the compound result of them all. In physics, for example, one law may truly enough prescribe that a magnetic needle should point to the north; nevertheless, if a mass of soft iron be brought near, the needle will in general be deflected. Similarly in the case of the mind, although our first law may prescribe that the output should be constant, yet the fourth law may intervene and render it actually variable. The same facts may be expressed in another way, which has the disadvantage of introducing a hypothesis, but on the other hand would seem to throw a wonderful illumination over the whole science of psychology. It is that *the mind acts as if it disposed of a fixed amount of general energy*. This view, after long being especially rejected and attacked by physiologists, has now at last found in physiology its most definite support. The epoch-making animal experiments and clinical work of Lashley point, he says himself—

"to the conclusion that a given area may function at different levels of complexity, and lesions may limit the complex functions without disturbing the simpler ones. Further, we cannot ascribe this limitation to the loss of some necessary elementary functions or to disturbances of nutrition or to shock, for it has been shown in some cases to be solely a function of the quantity of tissue. In this respect the limitation of complexity seems to accord with Spearman's view that intelligence is a function of some undifferentiated energy".[1]

To give even a moderately full account of the bearings of

[1] *Psychological Review*, 1930.

this law—including its theoretical significance for the nature of mind and body, as also its practical application to education, medicine and industry—would demand an entire volume for itself. An outline of its history may be found in the work already quoted.[1] For its practical application, reference may best be made to a recent book of Aveling.[2] An especially remarkable application of it, almost unknown even to psychologists, will meet us in the two following chapters.

The next quantitative law is very familiar indeed to psychologists. It is that of retentivity, and runs: "*The occurrence of any mental event inclines it to occur subsequently*".

But what psychologists have mostly failed to see is that this law divides up into two. On the one hand, it includes the disposition which any mental event acquires to occur *again*. The classical example is that of a creased piece of paper; ever afterwards that paper will incline to re-crease along the same lines. A natural explanation is that the first creasing breaks down some obstruction in the substance of the paper, so that subsequent creasing requires less force. The bearings of such dispositions upon psychology in general are, as is said, very well known; still in the following two chapters we shall encounter, it is believed, some unexpected new applications of these also. The other, and far less generally appreciated manifestation of the law of retentivity, consists in the fact that any mental event, once set going, comes to rest more or less gradually; its ending is

[1] On p. 26. See especially chaps. VIII–IX and the references to McDougall.

[2] *Directing Mental Energy*. University of London Press, 1927.

analogous to the dying out of the vibration of a tuning fork.[1] A briefer but essentially similar fact is the lapse of time needed for any mental process to get going at the start. Both phenomena would seem to be best regarded as some kind of mental lag or *inertia*. The discovery of this is one of the latest and perhaps greatest conquests of experimental psychology. And not the least of its triumphs has reference to our special topic, mental creativity.

The next law, almost the reverse of the preceding one, is that of *fatigue*. Hitherto, this has by most authorities not been admitted within the pale of psychology at all, because they assign it instead to the purview of physiology. Such a disavowal, however, rests upon the flimsiest of grounds. A physiological substrate is admittedly possessed by all or nearly all other mental characters also, so that it affords no reason for singling out fatigue. Perhaps the plea might be made that, in the case of fatigue, the physiological basis is better known than in any other cases. But such a statement would at least be questionable. The present writer for his part is inclined to hold that even about fatigue not nearly so much is known physiologically as psychologically. Even in the present volume, to which at first sight considerations of fatigue might seem quite alien, we shall more than once have to make surprising appeals to them. Expressed, then, in psychological terms, the law runs as follows: *The occurrence of any mental event produces an influence opposed to its occurrence afterwards.*

For our purposes, we may particularly note that this

[1] It is then said to "perseverate".

fatigue is of two different kinds, called respectively general and specific. In so far as the fatigue is general, its influence extends to mental operations of all sorts. In so far as it is specific, it remains confined to the particular sort of operation that produced it. Furthermore, it has been divided into the two kinds called respectively objective and subjective. The former is a loss of ability that probably depends on dissimilation of neural and muscular tissue and can only be abolished by rest. The subjective fatigue, on the other hand, is a loss of ability that seems to depend on *feelings* of tiredness and can be more or less effectively abolished by excitement, or even by effort of will. This second or subjective kind it probably is that mainly concerns us here.

The next quantitative law may be roughly expressed by saying that *the energy of the mind is partly under the control of the will.* But this law, though perhaps the most momentous of all, is unfortunately also the one that has been far the least intensively and successfully investigated. To avowed ignorance about this law, rather than to any deficient appreciation of its importance, then, must be attributed the inadequate part that it plays in the following pages.

The last of these quantitative laws has been called that of *primordial potencies.* It is to the effect that, over and above the first three which display both a mental and a physiological aspect, as also the fourth law which shows only a mental side, there exist further and primordial influences which, so far as can be seen, are solely physiological. The outstanding examples are those of heredity, sleep, illness and death.

¶ 2. QUANTITATIVE PROCESS. It will be remembered that the principles of quality supplied both laws and processes; these two were in fact one and the same thing, as may be observed in the very words that described them. But in the case of quantity, matters are different. None of its five laws expresses also a process. Instead, these five produce together only *three* processes (these are, of course, quite different from the three preceding ones for quality).

The most important of these additional three for our present purpose is that of *reproduction*. This occurs when the mental energy, taking the line of least resistance, is directed along those channels which have by previous usage —that is to say, by virtue of retentivity—acquired a disposition to receive it. All such mere reproduction, of course, is the very antithesis to creation.

We are now beginning to clear up the whole field. The preceding chapter dealt with the three processes which can produce new mental content, and we have just had the fourth process, which can reproduce old content. This must exhaust the possibility of any content appearing at all. But there remains the possibility of it disappearing, and this also constitutes a process. It is one, moreover, that, like reproduction, can readily be derived from the joint action of the quantitative laws. Still we need not trouble ourselves further about it, since *disappearance*, though vital for such operations as those of abstracting and conceiving, will play no large part in the following pages.

The sixth and last process—since we have exhausted the possibilities of anything either appearing or disappearing—

would seem to have no scope left for it except *variations in the comparative clearness of different parts*. Something of this sort is of very frequent occurrence. For example, whilst still looking at one and the same picture, a person may focus his attention (mental energy) on any number of different points in succession and then perhaps diffuse it over the whole.

¶ 3. COMPLETENESS OF SYSTEM. Here we may look back to the statement in the preceding chapter, that the principles of a science should above all things constitute a complete system. To what extent have we achieved this extremely difficult ideal ourselves? How near does our list of laws, three qualitative and five quantitative, approach to being an exhaustive one? The same question may be asked about the six processes.

When all these were first published (1922), the suggestion was ventured that no further ultimate laws or processes (dealing with cognition) could anywhere be found. From that time onwards, the amplest opportunity has been offered to criticism from every side. Yet, so far as I know, the position remains still the same; not a single further law or process would seem to have been so much as seriously proposed.

Particularly to be noted is the way that the three qualitative principles supplement one another in the order of mental development. Thus the third principle, since it postulates that relations have already been discovered, cannot possibly act until after the second principle which discovers the relations. Again, since the second principle postulates that some "fundaments" for relations are known already,

it can by no means precede the first principle by which the fundaments are originally brought to light.

Another point of interest is that the domains of the second and of the third principle are co-extensive. That is to say, whenever the one is possible, so too is the other. But, of course, this only refers to possibility in general. On any particular occasion and with any individual one alone of the processes may occur successfully, or neither of them. These two processes, it may be added, are often designated as "eductive", to distinguish them from those which are merely reproductive.[1]

Yet another observation that may eventually save trouble is that all six processes generally enter into close and intricate combinations with one another. Like the cells of the nervous system, they congregate together in immense numbers; and like these, they can only be isolated from one another by very careful teasing apart. But despite the large number of processes actually going on, often only a single one is pre-eminently conspicuous and important. Here, then, analysis becomes easy enough.

¶ 4. "NOEGENESIS." This all too concise account of knowing—as opposed to feeling and willing—may fitly be rounded off with something about the adopted name for such a view; this is "noegenesis". The word is not only new, but also long. Still, perhaps its length may not be excessive in

[1] An item in thought or perception is said to be "educed" from other items there when derived from these by their very essence or nature.

comparison with all that is packed into it. For this name represents a whole revolutionary doctrine of psychology. The second part of the name, "genesis", is intended to indicate that the three processes described in the preceding chapter possess just the virtue here concerned, that of *generating* new mental content. The first part of the name, on the other hand, is from the Greek "Nous", and indicates that these same three processes have the further virtue, formerly ascribed to some ill-defined power called "intelligence", of *attaining belief on adequate grounds*. For example, to have an experience of pain is adequate ground for knowing that one has it. Again, to have in mind two items (even imaginary ones) which are alike is adequate for knowing them to be alike. Yet again, to have in mind an item and something relative to this item is adequate ground for knowing the nature of the correlative item. Such knowledge upon adequate ground is sometimes characterised as "insight", or as "intuition". However labelled, it would appear to constitute the supreme achievement of the human mind; perhaps, of mind in general. And in such a manner these two virtues, that of creating and that of insight—generally taken to be opposite poles—are in truth absolutely coincident. This, then, is the doctrine wrapped up in, and proclaimed by, the single word "noegenesis".

To conclude this account of the psychological principles, it may be confidently hoped that any difficulties found in understanding them, when stated in this highly abstract manner, will soon vanish when they are applied in the following chapters to concrete and practical situations.

CHAPTER V

PICTORIAL ART

¶ 1. TRUTH. From all these theoretical preliminaries—the three qualitative principles of creation, as also the five quantitative principles needed to actualise them—from all this let us now turn to some of the chief applications in practice. And for such purpose, we will start with the ancient and honourable art of making pictures. For this has the great advantage of supplying examples that can be realised on our pages. But let it be understood that on such an exalted subject we proceed throughout with much diffidence, although—not to weary the reader—we shall refrain from interrupting our discourse with further apologies.

"To picture" is defined as being "to give visible representation of objects, as by painting, drawing, and the like". It excludes, we thus see, all pigment that does not represent anything else, but presents itself in its own right. Here would come, for instance, the numerous efforts of human beings to improve the coloration of their own bodies; from the naïvely decorative blue stain of the ancient Briton, and the dazzle-paint of the savage brave, to the more subtle "colour-culture" which enhances the sex lure of modern civilised females. But the picture, by its definition as given above, excludes even some kinds of representation. Thus, it has nothing to do with symbolising, where a word conventionally stands for—and in this sense, represents—that which it means. The kind of representation that does fall

within the purview of pictures consists in what depends, not on convention, but on likeness. And in so far as pictures attain to likeness they possess their first supreme virtue, that of Truth.

Not often, however, can the likeness be complete. In particular it may be only in respect of relations and not of absolute characters. This almost always happens with reference to the portrayal of space; the artist does not attempt to copy the real magnitudes of nature, but only to give the "forms".[1]

The same is true as regards light and shade. To copy these exactly would be impossible, seeing that in nature the brightest objects may easily be a hundred times brighter than the darkest; whereas on the drawing paper or canvas, one part cannot be made more than about twenty times as bright as any other. Abandoning, then, the ideal of reproducing the lights and shades just as they exist in the scenes or objects themselves, the artist has to content himself with producing lights and shades that at least bear the same relations to one another as do those in nature. In respect of brightness, then, just as in that of magnitude, the artist has to content himself with preserving the original "form". The task of finding lights and shades in the right relations and forms is often—not too aptly—called by British artists that of "values".

The case is no longer quite parallel, however, when we pass over from bare brightness and darkness to the so-called "tints" or chromas (the "colours", in the common and narrow sense of the word). Here, the artist usually has in

[1] Which consist of systematic relations, *cf.* pp. 20–21.

his pigments a range of variation quite as large as that which exists in the scene to be represented. But, on the other hand, further and worse difficulties assail him. For instance, the brightness and the chroma interact upon each other, so that the inadequate range of the pigment in respect of the former introduces most perplexing disturbances in respect of the latter also. Again, any pigment has quite a different surrounding field when selected on the palette from what it will have when it becomes part of the completed picture; consequently, both brightness and chroma may greatly change their appearance.

For a detailed account of all these difficulties which the artist has to encounter about values and tones, as also of the special methods which he has devised for dealing with them, reference must be made to the technical works on the subject. For the present purpose of psychological analysis, it must suffice to say that all such methods do but still further complicate the relation between that which the artist has actually before him in the scene and that which in his imagination (and subsequently in actual brush-work) he has to evolve out of the pigments provided. Thus even here, where he is supposed to be in quest of nothing more than the truth, his procedure is already in large measure creative.

¶ 2. BEAUTY. But now we will abandon our hypothetic limitation of the artist to the bare service of imitating. Even if, as many have held, he never transcends nature, at least he does not take from it indiscriminately. What, then, is his further aim or function?

Up to a certain point, an answer can be supplied which rests upon a wide consensus of opinion. It is the one which was already indicated by Plato and, under some guise or other, has been repeated by the great mass of writers ever since. According to it, that object has aesthetic worth which gives delight simply on being contemplated. Nor need we here quarrel even with those who take artists to be a class of beings so exempt from human vanity that they do not desire their works to be contemplated, and instead are satisfied with the sole delight of "self-expression". For, as it happens, the view which we are going to examine would cover even this case also.

Pursuing their explanation, most writers go a little farther readily enough; they attribute the delightfulness of the artistic object or scene to its "beauty". But trouble descends on them when they try to agree as to what this word beauty is intended to signify. All are willing to admit that it has a vast scope, from the softness of silk to the sublimity of martyrdom; that it is as ancient as history and as immense as the universe. But thereafter their accounts of it run riot in most divergent directions. Some would make it consist in manifesting the attributes of the divine, as infinity, eternity, purity, or love. Others would rather make it represent the perfection of animal life from the biological standpoint. Yet others would derive it from unity of design; or again, from variety; or from regularity; or from certain determined proportions; or from some material relaxation of the nerves; or from the number and clearness of relations suggested; or from keeping in all things to the mean between two

extremes; or from pleasure in ideals; or from usefulness; or from some specific "beauty-sense". Yet other authorities have held that "beauty" possesses no single meaning whatever, but only an assortment of meanings crowded under one name by vagaries of philological history.

Now, without denying that most, if not all, of these versions of the "delight in contemplating" beauty have *some* truth on their side, still for the most comprehensive and fundamental explanation we must, I believe, go back as far at least as Aristotle. He wrote:

"Pleasure is attendant upon every sense, as it is also upon every act of intellect and contemplation. But the most perfect is the most pleasant; and the most perfect act is that whose energy is well-disposed with reference to the best of all the objects which fall under it."[1]

This "pleasantness of contemplating" thus urged by Aristotle is itself evidently but a restatement of the "delight" discovered before him by Plato. Thus the only thing new contributed even by the Stagirite consists in the illuminating notion of "energy". And for an explanation with any claim to completeness, there is still one essential link missing. Beauty is a character of the object contemplated, whereas perfect energising is a state of the subject who contemplates. How shall a bridge be thrown from the one over to the other, so that what originally was subjective now becomes objective? This link will be supplied in the final chapter. For the present we may anticipate matters by suggesting that such an objectivation

[1] *Nicomachean Ethics*, Bk. x, chap. iv.

can only be derived from the doctrine of "noegenesis" as outlined in the two preceding chapters.

Under what conditions, then, will the "energy" of an act be more "well-disposed" or "perfect"? Surely, here is a matter on which one might reasonably expect to find valuable information in every current psychological text-book; for all of these ought at least to furnish the ultimate quantitative laws of the mind, upon which alone any "perfection" can legitimately be based. Alas, however, this primary mission of psychological treatises has not yet, in general, been fulfilled. To obtain such laws we can only turn again to the doctrine of "noegenesis".

First must be considered here, naturally, our law of energy itself (see p. 28). It enounces that the quantity of mental output must be regarded as constant. And this first quantitative law of psychology does at once prove to be that of art also; it is that which bids the artist to eliminate everything irrelevant to his aim (in this sense, "meaningless"). For since the total output of energy is obliged to be constant, every expenditure of it irrelevant to the aim must leave so much the less to promote this. An instance where rigid economy of detail leaves the energy of the spectator delightfully intact for the main object is afforded in the portrait of Madame Récamier, by David (Plate I).

Among the counter-instances where energy gets dissipated in false directions, a peculiarly disastrous one is afforded by any striking want of "balance". Harm may be done even by very trivial things if they are such as to "catch the eye". For example, this occurs in a seascape by

a well-known artist (it is hanging before the present writer), which loses much of its pleasingness merely because the highest point of the chief wave in the foreground just touches, and suggests being a continuation of, the chief wave in the background.

Plate I

Furthermore, this energy, as we have seen in the preceding chapter, tends to adopt a unified mode of distribution, namely, that of one single intense focus shading off into a less and less intense background. To obtain the perfect energising required by pictorial art, then, one primary requisite is that the aesthetic interest of the picture should be adapted to such a unifocal distribution of the energy. Here again we find that this psychological fact has been taken into

account in all good paintings; it is perhaps the most striking difference between them and inartistic photographs. A well-known special device, whereby the focus of mental energy is at once conducted to the focus of aesthetic interest, consists in linking the latter to a single principal light; for, as psychologists well know, a light instinctively attracts and holds attention (even in the first few days after birth). This device also is illustrated by the portrait just given. It reaches its climax perhaps in the works of Rembrandt.

The next of the psychological laws, which should hold the secret of perfect energising, is that of retentivity. In virtue of this, all mental acts are facilitated—as Aristotle would say, their energy is perfected—by *repetition*.

And turning from psychology to art, we once more find full accordance. Repetition is in good truth one of the foundation pillars of pictorial composition. Take, for example, the three "Dreamers" by Moore (Plate II).

Each time one glances anew from one of these to another, the facilitation by similarity and the feeling of this facilitation give to the spectator a fresh shock of joy.

But here a distinction must be made which, trivial as it might seem, is really fundamental. It lies between, on the one hand the mere occurrence of similarity (or any other relation), and on the other hand its being perceived to occur. That the former can happen without the latter is obvious. Think of the innumerable similarities that are ever before our eyes and yet ever escape our notice! Now, the facilitation and consequent joy which we have just been considering are afforded even by similarities that have *not* been per-

ceived. The act of perceiving them, if it does occur, affords a further and often far greater joy on its own account. To distinguish between these two different sources of delight is of great importance even for ordinary practical purposes; since the two require different mental attitudes. The bare facilitation is best enjoyed by a passivity which merely lets

Plate II

the perceiving of the picture take its idle course. But the other joy, that of perceiving the similarities, can only be secured in highest measure by an activity which goes keenly in pursuit of them.

For another example let us turn to the "Birth of Venus" by Botticelli, and notice the delightful repetitions in the ribs of the shell, in the ripples of the sea, in the successive headlands, the fluttering flowers, the vertical tree-trunks, and the folds of the drapery. Interesting enough is to compare

for oneself how far these repetitions are enjoyed by the passive and the active attitudes respectively (Plate III).

The retentive principle, besides producing facility for repetition of the same thing, also causes (as we saw in the preceding chapter) a tendency for one thing to reproduce

Plate III

other things which have previously been perceived or thought of in relation to it. We should expect, then, that the energy of an act of perception would be made well disposed by the fact of its objects being intimately related with one another. Turning from psychology to art, we again find a close conformity. Take as example the "Descent from the Cross" by Rubens (Plate IV).

Look how intimately all the figures are interrelated in

Plate IV

divers ways, how extraordinarily this fact renders the picture an intelligible unified whole, and how delightfully we realise this facilitation and its cause.

But throughout all this, again, the joy of the spectator has a double source. Besides that which springs from bare passive facilitation by previously known relations, there must also be taken into account the further joy which is won by actively perceiving the relations and the unity they constitute. Once again, then, each kind of aesthetic reward has its own most favourable road of approach; by way of indolence, and by that of diligence.[1]

A curious addition to such profits from relatedness is gained by the common artifice of grouping the principal objects of the picture into some striking relational system, as that of a circle, ellipse, pyramid, or even systematically arranged straight lines.

For a counter-instance, look back again at the work of Botticelli (p. 45). Here the relations between the two figures on the left are *not* clearly expressed, and the result is singularly unpleasing—if a word against this picture be not deemed sacrilegious!

What, then, about the next and third psychological principle, that of fatigue, whereby the effect of repetition does not consist in facilitating but in impeding, and so causes not joy but dolour? This might seem to contradict all that we have just been saying. But really this is not so. For *mere* repetition is by no means aesthetically pleasing; it is rather

[1] Some interesting notes on this difference of attitude are given by C. S. Myers in *Brit. J. Psych.*, XIII, 1922.

the reverse. To please, it needs to be intermixed with changes which refresh again. That is to say, the principle of retentivity which demands repetition must be supplemented by the principle of fatigue which requires variety.

Once more, however, the aesthetic reward is really twofold. The variety not only brings a passively enjoyable recovery from fatigue, but also furnishes material for delightful activity in perceiving further relations.

As an illustration may serve the "Golden Stairs" by Burne-Jones (Plate V).

Note the many repetitions of sweet maidenhood, of the flesh-colours, of the bright flowers, and of the actions of descending. But at the same time, see how all this is preserved from weariness by the fact that every figure presents in every respect its own distinct individuality. Observe also that the two characters, repetition and variety, are not loosely interlarded, but intimately wedded together. The very arrangement of likeness and difference is itself continually repeated with variations; and all this again, in rising order of relativity; such is the essential nature of degree of "organisation". Out of these two virtues, variety and repetition; these two relations of likeness and difference; this arrangement of them in higher and higher orders (which could almost be expressed in a definite formula); this joy that both of them render to the diligent spectator and yet do not deny to the indolent—out of these two there springs the miracle that is multiplicity in unity; differentiation with integration. From this same pair of wonder-workers derive harmony, rhythm, and balance.

Plate V

They are as two voices that sing the whole enravishing duet of the beautiful.

The next and fourth quantitative principle is that conation or striving intensifies cognition or knowing. This principle would seem to function in art, not so much by rendering the flow of energy more perfect, as rather by indicating how far it is so. When a person looking at a picture feels his energising "well disposed" towards it, he does not base this evaluation on the absolute amount of the stream, but rather on the ratio of this to the effort he makes. And he evaluates the energising of the artist himself in a similarly relative fashion. To such an origin may in part be attributed, for instance, the usual high appreciation of slight sketches.

The fifth principle is concerned with relativity of another kind; that which derives from inequalities between the mental powers of different individuals. In order that the energy of any person should be well disposed towards its object, it must be available in sufficient amount; otherwise the result will be failure, which is the reverse of perfection. Hence it is that the same picture which elicits very perfect energising in the sophisticated expert may produce only confusion and pain—would he but confess it—in the sight-seer whose capacity and training belong to other spheres. Indeed, with a mind of sufficient power, perhaps nothing could be more beautiful than simply the entire universe.[1]

[1] With all this perfection of energy may be compared the "facilitation of attention" so excellently set forth on an experimental basis by Valentine, *Experimental Psychology of Beauty*. London, Jack.

With all these five psychological principles, however, our account is far from being closed. These, being of purely quantitative nature, have only dealt with the perfecting of the energy in respect of making it flow with least possible hindrance. But there is another and still more fundamental aspect of the perfection; one that introduces yet a third kind of relativity, and moreover brings back on the scene the factor of striving or conation, which up to now has been dismissed by us somewhat cavalierly. From this further and more penetrating viewpoint, the ultimate condition for the stream of energy being perfect does not simply consist in its flowing with greatest ease, but rather in its easily flowing the way one person wants it to do. For energising to be "perfect," it must be obedient.

In its most general bearings, this deeper aspect of the matter opens up a pretty vista of metaphysical dialectics. The whole problem of ultimate motives is at stake. We are held up by a demand for the basic relations between knowing, striving, and feeling. Sharp questions come thronging around us like bees disturbed in their hive. Does every man necessarily want the easiest possible flow of energy? At bottom, does he ever want anything else? Is he pleased because he gets the thing he wants; or does he want a thing because he finds pleasure in getting it? What is wanted absolutely, and not in relation to any other wants?—But for the present, we must take leave to pass by such questions. There is danger lest "that way madness lies".

In its more specific references, on the other hand, this factor of conation cannot well be waived by us. For the sake

of the argument, let us grant that all persons do always want their energy to spring forth as unimpeded as possible, and that they find their pleasure in its doing so. Still, assuredly, they differ as to which channel they wish it to follow. Applying this to the case of painting, we may easily infer that if any person—whether by conviction, tradition, or mere habit—has adopted any particular view as to how pictures should be fashioned, then the spectacle of them made otherwise will thwart his conation and to this extent vitiate his energising. *For him* at any rate, the beauty will be defective. And here would seem to lie the most prolific source of discord between rival artistic schools. Even within the limits of the same school, the picture praised by the tyro may be condemned by the expert; and not solely because the latter sees it differently in itself, but also because he finds it farther from the standard which he has set up. Indeed, one and the same artist may find the same pictorial feature good or bad according to whether he has been expecting it or not. Thus, his displeasure at too much sameness in a picture may be largely due to his being balked of expected variety. Again, the unifocal arrangement of light and shade, so imperatively demanded by him in the case of the picture, may hardly be missed by him in that of a panorama where he did not hope for it. Even his cult of profounder unities may often be of similar conative origin; his enjoyment of the constitutive relations[1] out of which unity emerges may be largely due to this unity conforming with what he wishes and expects to find in nature because he has really found it

[1] *Cf.* p. 20.

in himself (see chapter XI). Such influence of expectation recalls the old story of the ship's crew who one morning complained of the quality of the coffee. The captain came and tasted it; he agreed with the men that it would be poor coffee, but added that it was quite good tea!

¶ 3. EMOTIONALITY. Not even beauty with truth added, however, make up the full tale of pictorial aesthetic worth. Indeed, strange to say, some artists have little use for beauty at all. For them, the delightfulness of contemplating objects should be largely or even wholly obtained by other means. Of what nature, then, are these?

Such further means to make a picture delightful would seem to consist at bottom in exciting emotions over and above those which derive from reality. These emotions are of a "make-believe" sort, analogous to the activities of play. They afford another channel for perfect energising in addition to those which we have already seen; this time a channel for feeling rather than for perceiving.

Real emotions, too, no doubt, may upon occasion be delightful; and even for the same reason. But, in general, they are far more limited in number and in kind; they are apt to derive from unpleasant situations; they often involve laborious and otherwise disagreeable responsive behaviour; and in all these ways, the perfection of the energy suffers woeful abatement. Of the make-believe emotions, on the other hand, anyone can pick and choose and take his fill. Moreover, they are essentially facile or "cheap". They come to us spontaneously by associative reproduction; and they

depart without driving us to irksome toil. Fatigue-free, we can roll, wallow and welter in them. For innocent recreation they have not their match. And our enjoyment of them even achieves, by some strange twist of thought, the surplusage of titillating our vanity.

Their origin would seem to be chiefly by way of association. In the case of the literary art, the emotions are attached to the ideas and have the semblance of being inherent in these. In that of the pictorial art, they may better be described as *ad*hering to their objects. In either case, the emotions tend to be projected from the subject to the object, as already mentioned about the perfection of energising and the character of unity (see pp. 40, 52). Instances are when a vast abyss shows signs of antiquity and power; or armies suggest the cruel shedding of blood; or a smile gives token of gaiety and friendliness. Even the simplest constituents of a pictorial object, its curves, its colours, and so forth, are rich in such associated emotions.

A characteristic of this type of aesthetic worth is its preference for what is vague and indefinite, such as imperceptible graduations rather than sharply cut lines. The vagueness affords all the greater scope for associative reproduction; that of the dreamy sort, as when seeing faces in the fire. Hence here, too, as in the case of beauty, a large part in the performance is played by the retentive principle.

The influence of fatigue, on the other hand, sinks here into comparative insignificance. Perhaps the reason is because an emotional mood tends with most people strongly to "perseverate" (see chapter IV, p. 30). And by means of appro-

priately associated objects, it can easily be reiterated and reinforced again and again. But to introduce strongly divergent emotions, for the sake of contrast and relief, is rarely even attempted, and is still more rarely successful. A remarkable warning has been supplied in the way that the magnificent "Tempest" of Giorgione has been disfigured by the all too homely proceedings in the foreground (Plate VI).

In general, the artists giving more support to this second kind of aesthetic worth are those of the vague, mystical, and passion-tossed, "romantic" school, who refuse to let the caprices of the poet come under any strong control; certainly not under the laws of unity or regularity which govern the opposing and beauty-worshipping school of "classicalists". As an illuminating contrast between the two—each represented at its best—may be viewed the pictures of Turner and Claude, hung for comparison side by side in the British National Gallery.

¶ 4. EXAGGERATION. But this is not the end. With truth, beauty and make-believe emotion, the resources of pictorial art are by no means exhausted. So far, we have been mainly concerned with artistic composition, whose essential task is to select from nature a favourable set of objects and then modify these so as best to fit one another. But when we delight in the grace of Botticelli's "Venus", or the power of Michel Angelo's "Man", or the psychic revelations in a portrait by Velasquez, the picture seems not merely to recombine nature but to transcend this; it is more intensely expressive.

In part, no doubt, the superiority of such pictures to nature can still be explained on the same lines as before. For

Plate VI

the expressiveness of any character may well be increased by eliminating irrelevant features, which in ordinary life drain the spectator's energy in other directions. Again, the uni-

focal distribution of energy[1] must help to the same end. And just as before, repetition must reinforce whilst variety must refresh.

Over and above all this, however, the expressiveness of the picture would seem to be greatly enhanced by the simple device of exaggeration! A lucid example is supplied in the following "Lines expressive of Storm" by Crane (Plate VII).

Plate VII

Here is an indubitable instance of creative art. That he actually ever saw such a scene is most improbable. Far more likely is it that he had noticed, and been emotionally affected by, the bending of trees in an ordinary gale of wind. To achieve his picture, then, all he had to do (in this respect) was to increase the bending *beyond* his previous experience and thereby produce the appearance of a storm that also transcends experience.

[1] *Cf.* p. 42.

His companion picture of "Repose" is analogous (Plate VIII).

Plate VIII

For another illustration let us turn to two pictures of the female form which illuminate each other by their contrast, the "Venus" of Botticelli, and the "Eve" of Pollaiuolo. Botticelli had, of course, seen many female outlines and attitudes with characters which suggested to him tenderness and grace. Particularly effective among such characters is that the curves should be few in number and with gradual transitions; they should be, in fact, what statisticians call "smoothed". Such smoothness, then, the artist proceeds to make even smoother.

Now turn to the "Eve" (Plate IX). This time the artist has not set out with his experience of the tender, but rather with that of the bucolic. Hence, contrary to the previous case, the curves recalled from his experience had been numerous and abrupt. In the picture they are made still more so.

Plate IX

To exemplify further this aesthetic exaggeration, almost any picture may be taken at will. Instances that at once come to mind are the super-human devoutness of expression in Raphael's "Ansidei Madonna"; the extra-strong muscular contraction of the soldiers in Morot's "Rezonville"; the extra-weak contraction of the resigned peasants in Millet's "Angelus"; above all, the masterpieces of portraiture in all ages, which have invariably been based upon picking out some visual characteristic of a person and then slightly exaggerating it.

Still, this device of increasing aesthetic effects by means of exaggeration has, of course, its limits. Beyond these, some other emotional effect is sure to arise which does not aid the

Plate X

wished-for aesthetic worth but conflicts with it. Herewith we reach—and explain—the essential nature of caricature.

¶ 5. SELF-EXPRESSION. But even now we have not exhausted the main achievements of pictorial art. We have considered the truth of a picture, its beauty, its emotional associations, and its exaggerations. Now we may turn from what the artist paints to the *manner* in which he paints it, and thus arrive at what is called his individual "style". In referring to this, however, we shall not be concerned with purely technical individualities, such as peculiar ways of handling the paint-brush and palette-knife, or of superposing the pigments in successive layers. These, after all, are not visual appearances in themselves, but only the means to obtain them.

Turning to the styles that do appertain to the visual appearances, a striking individual difference lies in the character of breadth. Some artists, as Meissonier and Holbein, attempt to render the finest details. Others tend more in the direction of theatrical scene-painting; they ignore all details that would not be distinguishable at the distance from which they demand that their pictures should be viewed. Another frequent simplifying tendency is that which regularises the outlines. In this way, for instance, the foliage of trees, which in nature is infinitely varying, may in a picture be combed out into something more like a bunch of ostrich feathers.

But such "stylisation" may go far beyond mere regularity. Many an artist possesses some half a dozen peculiar "structures" of line and shade, which are imposed by him schematically upon picture after picture. He, and particularly his followers, often push this tendency to the verge of caricature. An instance is supplied in the picture by a "Cubist" (Plate XI).

But herewith we are passing beyond the frontiers of what has been called "orthodox" art. The latter may perhaps be

Plate XI

described as that which rests on the philosophical doctrine of the "plain man". In this, the world is assumed to be really

as it appears to be when viewed under standard conditions, such as deliberate attention to each detail. But from the earliest times many philosophers and psychologists have been more or less sceptical on the question; they have contested the claim of even the standard sensory perception to reveal to us the external world as it really is. If, however, the standard perception does not achieve this much; if at bottom it too is but an appearance; then there seems to be no good reason why art should be restricted to this one alone. Why should it not make what use it can of other appearances also? Why not abandon all pretence at presenting things as they really are?

Partly perhaps on such philosophical grounds, and certainly because they wanted to do something new—so as to escape from comparison with the masterpieces of older times —there arose a school of "impressionists". After several earlier movements in this direction—going back to Carpaccio and reaching its climax of effectiveness with Turner—it invaded art on a large scale during the latter half of the nineteenth century. It found its leaders in France, conspicuous being the names of Monet, Renoir, Sisley, and Pissarro. The last, in particular, refused to paint his pictures in sharp focus, alleging that nature, however sharp in itself, cannot be observed in this fashion. As a matter of fact, we can really see at any rate a *bit of it* sharp. But Pissarro impartially painted his pictures fuzzy *all over*. As an excuse for him, it was subsequently urged that this occurs even in real vision, if we confine ourselves to only blinking at things.

The "blinking" business, however, looked too much like an attempt at rationalisation. And after all, why should not

the painter frankly say that he made his outlines blurred because he liked them so? But such a movement opens wide the gates. If the artist is no longer to be cribbed within the bounds of possible real vision and is to be allowed instead to present whatever visual appearances may best please him, why should he stop short at blurred lines? With equal right, the pigment could be made to subserve any other tricks of the imagination. Accordingly, painters began to vie with one another in the license that they permitted themselves. All kinds of unreality were exploited. There arose in quick succession the schools of "post-impressionism", "cubism", "futurism", "expressionism", and so forth. And an astonishing harvest they produced; not indeed of beauty but of emotion-play.

Nor has even the hard-headed business man been slow to recognise the attractiveness of such a style, as is illustrated by the following advertisements of handkerchiefs:

Plate XII

But along this path of subjectivity the new artists soon came upon what might almost be called unfair competition.

Plate XIII

The fantasies introduced into visual appearance by even the most skilful among them found more than a match in those which were introduced without effort by certain persons suffering from schizophrenic insanity (Plate XIII). For this embarrassing situation, two remedies were found. One was for the artists to follow the insane. The other was for the insane to become artists. Both solutions have had their followers—with honours divided. Compare Plates XIII and XV.

CHAPTER VI

PSYCHOLOGICAL ANALYSIS

¶ 1. IMITATION. The main achievements of pictorial art, five in number, have now been told. And they have been illuminated by the quantitative laws set forth in chapter IV. There still remains, then, to analyse them in the light of the *qualitative* noegenetic laws. Here at last we shall approach our main task, which is to examine how far and in which way the mind displays the power to create.

Let us begin with the simplest case of the simplest achievement, that of copying or imitating nature, so serving the cause of truth. We may suppose a person to have in front of him on the left a sheet of paper presenting a horizontal straight line, and on the right another sheet which is blank for copying. Such a situation is given in the following Fig. 4.

A B

Fig. 4.

Stripped down to its core, the task of the person is to imagine on the side B, a line similar to that seen on A. Now here he is given two things: (1) the horizontal line which he sees on A; and (2) the relation of similarity, which he remembers from experiences of it between things that, in general, were *not* such lines. His task is, then, to displace this relation from the things where it was really discovered to quite a different thing, the line on A. By so doing, he creates mentally (and afterwards physically), the correlative

line on B; briefly, the "correlate". That this process can be and actually is performed, any one can try out for himself on the preceding figure. Here, indeed, as in almost all other cases, a great many variations of mental procedure are possible in detail. For instance, one can either take each line straightway as a simultaneous whole, or else one can arrive at the same result by the mediation of eye-movements. But in whichever way one goes to work, the essential ultimate process remains as described, the educing of a correlate according to our third principle.

Let us pass on to the more complex case, where the object has not to be copied absolutely, but relatively. For instance, our subject may have been told to make his new horizontal line on B in the same ratio to the vertical line on B as the horizontal on A is to the vertical on A:

Fig. 5.

The result will be as indicated by dots.

This time there are *two* essential processes. By the initial one of these the person perceives the relation of the vertical to the horizontal line on A (case of second principle). And by the terminal process he transfers this relation to the vertical line on B, thereby obtaining the horizontal line on B (case of third principle).

¶ 2. BEAUTY, EMOTIONALITY, AND EXAGGERATION. From such bare production of truth let us go on to that of

beauty. Primary among its needs, as we saw, is to introduce repetition. And this, at its simplest, is nothing more than what we have just been trying out; the figures on B were repetitions of those on A. In order to bring in also variety—the indispensable complement of repetition—no change is required in the form of the process, save that the relation of likeness has to be replaced by that of unlikeness. And the form becomes only more complex, not essentially different, when the likeness and the unlikeness have to be intimately blended together and furthermore are extended to wholes of higher and higher order, as described on p. 48.

Let us turn next to the relations in a picture *other* than those of likeness and unlikeness. Our example in the preceding chapter was the "Descent from the Cross" (p. 46). Now, by the time that Rubens had decided upon his general theme, he naturally must have known the appearances of the principal personages in their normal attitudes. Accordingly he would now have to ask himself: How will their normal appearances be modified by their helping in the drama of the Descent? To solve this problem, the general form of the mental process cannot well be other than that which occurs in the ordinary test, where the subject is shown a folded piece of paper with a notch cut in it and is asked how the paper will look when unfolded. In either case a situation is given (the normal appearances of persons, or the folded paper). So is also a relative character (the taking down of a heavy object, or the being unfolded) which has really been known in different circumstances. The task, then, is to transfer the given relative character to the given situation, thus

educing the "correlative" situation. Once more, clearly, the third principle is called into play.

The pictorial achievement next considered by us was that of make-believe emotion. Here the form of process is closely analogous to what occurs in the case of beauty. For again different objects have to be assembled—usually by means of remembrance—and then have to be adapted to each other according to the rules of art. Such adaptation consists once more in applying to the remembered objects some relative characters (also remembered) which will transform the objects into suitable components for the picture.

Going on with the achievements narrated in the preceding chapter, the next one manifests its form of process even more obviously. For "exaggeration" is simply obtained by the very familiar relation of "more so". This may be applied to any observed interesting feature in natural scenes or objects —such as the bending of trees in the wind, or the smoothness of female curves, or the intensity with which the muscles are contracted.

¶, 3. SELF-EXPRESSION. Nor is even the fifth and last of the previously described achievements, that of self-expression, essentially otherwise. In spite of now breaking loose from the necessity of having to imitate nature, as also from the shackles of traditional orthodoxy, not the most modern school can escape from the inexorable limits of psychological form. The abandoning of plain correspondence between picture and what is depicted results only in introducing some further and more complex relation between the two.

Commonly, this further relation is one which may be described as that of "best fitting". This becomes an appreciable factor even in what is called painting with breadth; here, the exceedingly numerous gradations in the original objects are replaced by a small number in the picture; clearly these few have at any rate to be made to "fit" as best they can. And with those schools of painting where the departure from the original grows more extravagant, then the use of this relation becomes only the more conspicuous. An instance is given in "The Ship", by Friesz, where natural hard angular rocks are replaced—to carry on the *motif* of sex—by best fitting soft pulpy masses (Plate XIV).

Still more obvious is this business of fitting, when we turn back to the "Lady" of Picasso (Plate XI). Here each natural projection—nose, cheek, finger, fan-stick, etc.—is in the picture represented by the best fitting prismatic body.

And the climax is reached in the "Still Life" of Braque (Plate XV), which is said to be one of those cases where the artist "will brood over still-life arrangement, and will later on reconstruct the image of that which was formed in the strange recesses of his mind during contemplation".

Here, the original material is supposed to have been some tiles or sheets of metal on either side of a beam of wood, together with fragments of musical instruments. These in the picture are mingled higgledy-piggledy, superposed on one another as if partially transparent, and mixed up with abstract designs. Indeed, the fitting of the picture which the artist has chosen as the best possible might perhaps to other persons appear more like the worst possible. It may be

compared with the picture by a schizophrenic patient (Plate XIII).

Thus, throughout all five achievements of pictorial art—truth, beauty, emotionality, exaggeration and self-expression

Plate XIV

—the final and most highly "creative" act of the artist derives from transposing relations from their original fundaments to others, thereby creating (mentally) the correlative fundaments. And the so doing is neither more nor less than the third noegenetic process as described in chapter III.

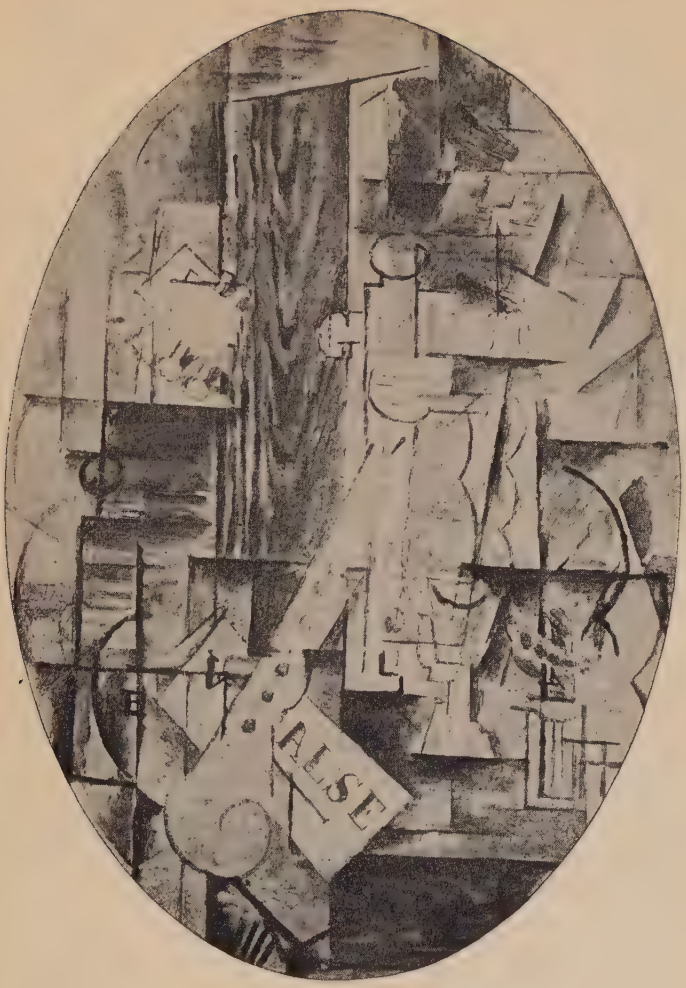


Plate XV

¶ 4. INDISPENSABLE PRELIMINARIES. Let us guard, however, against rating this process more highly even than it deserves. After all, it only arrives third in mental development. When making a picture, it is but the last act, not the whole performance. As we have already seen, it postulates that the painter should already know the relations involved. And such knowledge must have been acquired, not by the third kind of process, but by the second.[1]

But to get back to the second process is still not enough. There remains to take account of the first which (in essence, if not in time) must come even earlier. For no one can perceive relations until he has become acquainted with the characters or fundaments that are related. And those of the lowest and ultimate order can only be given to him in his own experience.[1]

Now, of these ultimate experiences, the mere quality of his sensations (visual or otherwise) offers in general no great difficulty. Red, blue, black, white, and so on, are by most people perceived sufficiently well. But the artist has to concern himself with a far more embarrassing matter. In addition to, and intimately intermingled with, such gross sensory characters, our perceiving contains a vast amount of more tenuous stuff, which in texture resembles "thinking". This addition is sometimes described—though not without danger of grave fallacy—as the "interpretation" or "meaning" of that which is actually sensed. Unlike bare sensation, it would seem to depend mainly on the person's previous experience. Take as example the usual view of a distant land-

[1] For comparison of the three processes, see diagrams on p. 23.

scape. It presents a haziness of outline and bluishness of tone which appear to be actually sensed. But in addition it looks distant; and this character belongs to the second or interpretative kind of constituent in perception.

The vital importance of learning to cognise the sentient character of vision as distinguished from its interpretative character may perhaps be brought home by the fact that it constituted the main history of orthodox painting from its birth in the thirteenth century with such artists as Cimabue and Duccio, to its culmination in the fifteenth with da Vinci, Raphael, and Michel Angelo. Even more vital, if possible, has been this matter for the subsequent development of the *un*orthodox schools. Whatever behaviourists may say or do, artists at any rate should own the profoundest of debt to introspection.

But even now we have not yet got back to what, in a way, is the most indispensable preliminary of all. This is not a cognitive process of any order, first, second, or third. It is the capacity for and experience of emotion. Already in the case of pure beauty this plays an essential part, seeing that objects are beautiful only by virtue of engendering in the spectator the emotion of delight. So long as this does not happen to him, he may energise never so perfectly (and even be aware of so doing), still beauty will remain for him a sealed book.

But if emotion is so needful even for the pure beauty of the classical school, what shall we say for the other source of aesthetic delight, the reproduced emotion alone cherished by the romantic school? This obviously implies that the

emotions should previously have been experienced. On the whole, then, he who would create aesthetically must first of all, not only observe, but also feel.

¶ 5. SUBCONSCIOUSNESS. Here we must briefly touch on a matter which to many readers has possibly been a surprise and disappointment. All this time, nothing has been said about that influence which numerous authorities have extolled above all else, as being the very fountain-head of creative genius, namely, subconsciousness. Have not definite instances been reported again and again, it may be urged, where artists have toiled consciously for long periods without success, and then—days, or perhaps weeks, afterwards—the long-sought inspiration has arisen in their minds spontaneously without effort? Does not this clearly indicate that the task which had been abandoned by baffled consciousness was then taken up by the greater potency of subconsciousness? Moreover, it will no doubt be added, this curious occurrence has not been confined to art; it has also been repeatedly reported of the great feats of science.

To such a protest, the present writer would freely admit that subconsciousness may possibly—even probably—be very active in the exploits of both artistic and scientific genius. But he certainly disbelieves that subconscious activity is *limited* to operations so peculiarly exalted and creative. On the contrary, it seems to be responsible for much the greater share of all mental operations whatever, high or low, creative or merely reproductive. Accordingly, we have been tacitly assuming throughout the preceding pages that *both*

consciousness and subconsciousness are taking part in the work.

Still, whilst so willingly recognising the influence of subconsciousness in a general way, I must confess to doubting whether it has much to do with just those great feats that are cited on its behalf. For here the success—obtained after hard work, followed by long rest—is already explained well enough by our familiar principles of retentivity and fatigue. The preliminary work must be credited with producing a mental development that is at the time masked by supervening fatigue. But much of the development is retained even after the fatigue has died away; save for this remarkable fact, almost all improvement by practice, or even formation of habits, would become impossible. We need not then really wonder that, after a sufficient rest, the operation may often resume its course with a success which—when knowledge is lacking of the noegenetic principles—seems almost a miracle.

¶ 6. CONCLUSION. Our examination has resulted in showing that the final act in creativity must be assigned to the third noegenetic process; that of displacing a relation from the ideas which were its original fundaments to another idea, and thereby generating the further idea which is correlative to the last named, and which may be entirely novel. The general scheme is $a : b :: a' : (b')$, where (b') is generated. But we have been obliged to add that the complete explanation of the matter involves furthermore the other two noegenetic processes,[1] as also reproduction,

[1] See p. 23.

emotion, and subconsciousness. And this applies not only to the artist himself but also to those of us who truly appreciate his works.[1] But does the explanation perhaps demand anything *more* than these? Has anything vital still been omitted? Does the pictorial art, especially in the hands of genius, possess any yet further originative power? One so subtle, so splendid, so supernatural, that at last our noegenetic processes fail to keep abreast? Something that, as Ward and so many others have believed, differs *toto genere* from all that can be achieved in minds of ordinary calibre? On such a problem it would be rash to dogmatise. But the present writer for his part finds himself forced to conclude that the credence in any such further and transcendent faculty is unwarranted by any known facts whatever.

[1] For this purpose, we must "repeat ourselves the creative act in which the artist gave birth to it." *Education, its Data and First Principles*, T. P. Nunn, 1930. On several points a valuable supplementation of the two preceding chapters will be found in the *Grundfragen der Ästhetik* by Wirth, 1925.

CHAPTER VII

THE OTHER FINE ARTS

¶ 1. OTHER PLASTIC ARTS. Since the preceding account of the pictorial art, though so brief, has been fairly systematic, we may for the other fine arts content ourselves here with a less methodical treatment; and some of them, such as sculpture, we may pass over almost in silence, seeing that their principal factors—as the expressiveness of mass, plane, and surface—are closely analogous to what we have already met in the case of depicture; whilst their secondary factors—as chiaroscuro, gesture and colour—coincide with what we have seen more closely still.

More change might seem to be presented by architecture. For here the first virtue is not—as in the case of depicting and sculpturing—Truth, but Utility. A building is not primarily intended to copy anything, but to serve a purpose; in general, that of affording shelter. But to attain to efficiency for this purpose is the task not so much of the artist as of the inventor; in this reference we shall meet it later on. For the moment, then, this distinction of buildings from paintings, that the former are primarily useful, does not concern us.

Our present interest in architecture comes in only when the edifice is intended, besides serving its practical purpose, also to evoke delight in its mere contemplation; and this it achieves, as is done in all other fine art, when its appearance is such as to favour the contemplator's "energising". Just as in the other cases, moreover, it manages this in two ways;

by its pure beauty; and by exciting make-believe emotion. Of the former, the great exemplar is supplied by the classical architecture of the Greeks, which was founded on proportion; obviously a blend of likeness with difference. A contrast with this is afforded by the "romantic" architecture known as Gothic, which so largely depends on the religious emotion associated with lines striving towards Heaven. As a nation especially favouring the beauty side of aesthetic worth, we may quote the French. At the opposite extreme stands here—as in the case of painting—the British nation, whose architectural achievements have little pretence at harmonious proportions, but excel rather at evoking in the spectator emotions connected with domesticity, as is exemplified by its admirable manor houses and bond-timbered cottages.

As to the actual realisation of these two aesthetic aims, here too the parallelism with the pictorial art is remarkably close. For attaining beauty, the architect no less than the painter has to grip the whole of the contemplator's energy by elimination of the meaningless; to distribute this energy about a single focus; to reinforce his impressions by means of repetition; to refresh them by variation, and in all this to provide him with material for perceiving highly organised relations. Further, for inducing the play of emotion, the architect, like the painter, must needs make use of associations, such as that of size with grandeur, solidity with power, or outline with movement. The differences between the two crafts do not respect the broad lines of procedure, but only the means of carrying them out. Among these means, however, a notable one peculiar to architecture derives from the very fact of its

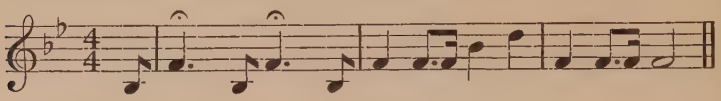
usefulness. For such virtue, though not in itself beauty, may engender it; the more perfectly a building suits its purpose, the more perfect may become the energising of the spectator in perceiving this suitability itself.

The analogy between the architectural and the pictorial arts may be pushed further still. For even the subjectivity of the painter, when he wilfully mixes up real appearances with his own fantasies, has its counterpart with the architect also. Thus, if in pictures we find foliage like ostrich feathers, and even rocks like soft pulpy masses, so in buildings we come upon Corinthian marble capitals imitating baskets of flowers, and Chinese wooden roofs sagging after the fashion of tents. From its summit to its underpinnings, scarcely a feature can be found in any ornamental building which is not more or less transformed from its plain utilitarian structure by dint of having imposed on it some modification that is but a sportive mimicry of something else.

¶ 2. MUSIC. Let us pass on to the art of music. Here the scope for creativeness would seem to reach its maximum. For the fetters in which all the other arts were constrained to labour—the need of pictures to be more or less true, that of buildings to be really serviceable—are now burst asunder and thrown aside. If only a work of music can, by its intrinsic nature as a combination of sounds, produce in its hearers the required aesthetic "delight", no more is demanded of it.

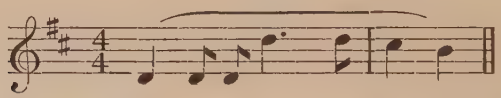
By what manner of means, then, is this delight brought into being? Surely it is already in some degree achieved from

the very beginning. Consider, for instance, the interval of a fifth which heralds in *The Last Post.*[1]



Already with the first note, the hearer begins to enjoy himself. Possibly all sensations are pleasurable when of a certain medium intensity; the energising of his sensory organ, we may plausibly suppose, is degraded by stimuli either too weak or too strong for it. On hearing the second note, the enjoyment becomes tenfold. Essentially, this is because he perceives the two notes to be in musical relation. And on the relation being scrutinised, it would appear to involve a subtle combination of likeness and difference (a compound effect that physical science can trace back to overtones).

Turn to the octave, as exemplified in *Annie Laurie.*

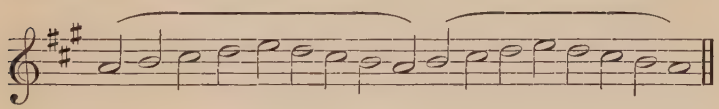


Again there is pleasure, but less. The combination is rather "dull"; it is too easy. There is too much likeness and too little difference. Turn instead to notes separated by only a semitone, and again the pleasure is less than from the C and G; the likeness is this time in defect. Generalising, we find that the pleasure in a musical interval reaches its maximum when the likeness and the difference between the two notes occur in a certain proportion, though this indeed varies

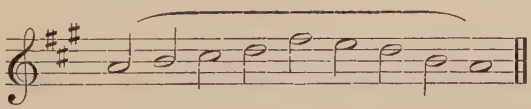
[1] This and the following musical illustrations come by kind permission from the delightful Melody Making of Sir Walford Davies.

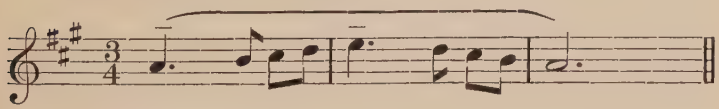
largely from one individual to another. The naïve ancients favoured even the consonant octave, possibly because they were painfully sensitive to feelings of dissonance; whereas the sophisticated moderns, inclining to the more cognitive sort of aesthetic appreciation (see page 44), have moved so far away from consonance as the minor third.

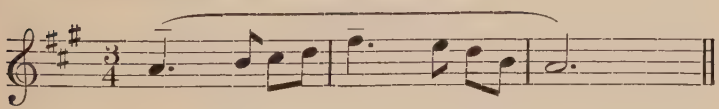
Broadening our view from two notes to a whole theme or melody, again we find that too little change is fatal to aesthetic worth. In the following example we have what Davies so truly characterises as "a dull wearisome outline".



By introducing a change between rise and fall, there is manifest improvement.



An alteration in the rhythm is similarly beneficial.

Both changes together are better still.

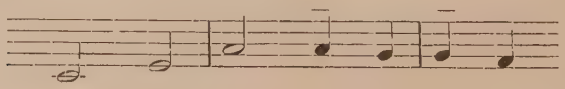


Extending our contemplation to larger musical wholes, we find just the same thing upon higher and higher planes.

Thus, a movement in a sonata of Beethoven will present a pair of themes in many repetitions but always in different variations; if not in actual notes, at any rate in nice shade of expression. The structure of the music would seem to have precisely the same general features as those of pictures; repetition refreshed by variation; unity integrated from multiplicity. And the effectiveness of these features is explicable, as before, by their conforming to the principles of retentivity and fatigue, as also by their supplying organised relations to be perceived, so that the energising of the hearer is made "well disposed" to what he hears.

But few artists would admit, especially nowadays, that such formal perfection constitutes the sum and substance of all musical worth. Indeed, many listeners find pure beauty intolerable. Like Guinevere, they crave not the cold heights of Arthur, but rather the "warmth and colour" of Lancelot. How is this to be obtained in the case of music? Surely, as in the case of the other arts, by what we have been calling the associative emotion-play.

Of this last, however, music possesses some specially prolific sources. Pre-eminent among them are the associations that pitch and loudness have acquired with the emotions through their natural union with these in verbal expression. At this moment I open a book at random and find the following words: "He is equivocating". In saying these words aloud, I find them fall spontaneously into something like the following little tune.



And so, universally it seems, emotional speech is naturally linked to certain forms of pitch, loudness and rhythm; whilst conversely these forms of sound acquire the property of reproducing the emotions. An amazing example of intimacy in such association is afforded by the operas which marry the words of Gilbert to the notes of Sullivan.

And as in pictures, so too in music, this emotional expressiveness can be greatly enhanced by the device of aesthetic exaggeration. Thus, when once the ordinary deep tones of voice have, from their connections with ordinary virile manhood, come to inspire a moderate emotion of respect, thereafter the far deeper tones of the organ may vaguely suggest a far more terrible power regarded with the correspondingly stronger emotion of awe. So, too, when once women with their comparatively soft voices have habitually excited gentle joy, thereafter the still softer trillings of the flute may suggest angels and reproduce the ecstatic emotions appropriately felt towards these. Or the slight harshness of voice that has come to indicate human anger may subsequently be the reason that a strident discord conjures up emotion associated with diabolism. To this extent then, all music is a sort of singing.

But, furthermore, slow music suggests slow movement and hence dignity; quick music, liveliness; and so on. Particularly effective is musical rhythm, which exhilarates by suggesting motor rhythm. (The latter itself is an example of energising perfected by alternate repetition and repose.) We may say, then, that music not only sings but also dances.

This type of aesthetic worth admits of being pursued by

artists much further. An infinite variety of characters and forms of sound become somehow or other associated with special emotional experiences. In fact, every type of situation in life—a busy street, a battlefield, or a quiet country-side, a gathering of adults or of children, one of Englishmen, or of Frenchmen, or of Arabs—possesses each its own characteristics both of sound heard and of emotion felt, so that these two become associated together.

As in the case of painting, so also in that of music, all this emotion-play has throughout modern history continually waxed at the expense of pure beauty. The romantic art has more and more driven the classical art from the field. In this fashion, Bach, Scarlatti and Handel gave way to Haydn and Mozart. These again, to Beethoven. The advance was continued by such musicians as Schubert, Mendelssohn, and Chopin. Then came, far outstriding others in the progress of the emotionalism, the splendid works of Wagner. Small wonder that these seemed harsh and unmusical to those who had been trained to understand and enjoy the old and cold pure beauty of form. Amusingly, but not unnaturally, this Wagnerian music, which thus passed the comprehension of many of the best older musicians, was warmly welcomed by numerous persons who had previously been regarded as unmusical. These were indeed, probably, inappreciative of musical form; but this limitation by no means necessarily involved their being deficient in emotional reproductiveness.

The culminating point of this tendency to put associative reproduction above formal beauty arrived with the so-called "programme" or "descriptive" music.

In what rôle, then, does that which is specially designated as the "new" music figure upon the scene? As might be expected, it still moves away from clear cut beauty towards vague emotion and obscure relationship. Its distinctiveness lies in recking less *what* emotion. Most severely it has been portrayed as follows:

"Since Mozart, orchestras have grown and grown in size and multiplicity of instrument. More and more colour; more and more noise; brass let loose; motor-horns and anvils brought in to produce something even more violent than brass. We rave, or in reaction against raving we make little, wandering noises like Debussy."[1]

But the present writer cherishes towards this new music a friendly feeling; for at least he owes to it a higher appreciation of the old. Anyway, apart from excesses, it does but follow the same general tendency that we found in the case of the "new" painting.

Accordingly throughout the art of music—in so far as our hasty review could touch it—we have found only the same essential types of aesthetic worth as in the other arts. And we may easily infer that the forms of mental process are essentially the same in both cases. As regards creativity also, then, we can conclude that the case here does not differ materially from what we found there.

¶ 3. LITERARY ART. Last of the fine arts for our consideration is that of literature. And we may perhaps compare it most profitably with pictures. As the painter undertakes to

[1] From Squire.

represent the physical world outside him, so the writer has the task of representing the thoughts within him. And as the former employs for this purpose the medium of pigments, so the latter uses words and phrases. Again, as the painter is impotent to imitate the appearance of nature with exactitude and can only, by means of "value" and "tones", bring about a sufficient approximation, so too the writer can only hope, by the devices of literary composition, to let his thoughts shine through his words without being intolerably disfigured.

But now comes a remarkable difference between the two cases. The beauty sought by the painter is, in the main, that of his medium itself; his aim is not so much to represent beautiful nature as to represent nature beautifully. With the literary artist, this occurs in very much less degree. Indeed, in respect of its visual aspect, the aesthetic value of language seems to be nowadays almost neglected; the art of illumination only clings to a flickering existence in such refuges as Christmas cards. With respect to the auditory aspect, matters are not so bad; some trouble is taken to secure euphony, even in prose; in poetry, this solicitude may be carried very far. And if we turn from the intrinsic nature of the sound to its emotional associations, then its importance in literature becomes all that could be demanded. Such an association, it is, for instance, that has singled out the following lines for fame. One can almost hear the galloping!

"I sprang to the stirrup, and Joris, and he;
I galloped, Dirck galloped, we galloped, all three."

But whatever may be the deficiencies of words on their

sensory side, they richly recoup themselves, if not in beauty, at any rate in emotionality, when it comes to their meanings. The associations of these are far more numerous, finely differentiated, and spirit-stirring than those of pigments. The very thing which when seen remains always the same (and that commonplace) may when described run through the gamut of feelings. The identical man, with the same visual appearance of eyes, nose, mouth and so forth, may be presented verbally either as "that hero" or as "that traitor". The identical contraption of wood and iron may be called either "an agricultural instrument for throwing earth" or just—"a spade".

This superiority of language already noticeable in single words and phrases is redoubled on turning to more complex structures. The medium of the writer affords scope for much greater diversity of material and subtlety of union than the most cunning hand can impart to canvas or stone. And its results can attain to regions correspondingly more remote from anything real. So much the higher, then, appear its claims to the title of "creative".

A striking example of copious inventiveness is afforded by the elder Dumas (if he can be credited with but a tithe of what he has signed). And even he may nowadays be challenged by Edgar Wallace. Less in amount, but perhaps all the finer in quality, are the masterpieces of a Wells, a Barrie, a Lewis Carroll, a Mrs Shelley.

If we pass from such modern literary production to that of ancient times, we find it to be even more abundant, more adventuresome, and, to boot, no longer admittedly fictitious,

but accepted as the truth; indeed, as the truth of truths. One great section of this bygone literature is that of mythology. It consisted mainly in imagining the seen world to have unseen behind it a great throng of gods and devils, heroes and demons. We read of Maui, the New Zealand Sun god, who with his magic hook fishes up an island from the bottom of the sea. Even he is outbidden by Vishnu who, taking the form of a boar, dives into the ocean and carries up on his mighty tusks the whole submerged earth. We learn that the rainbow is a ferocious devourer of men, women and children; that a plague is really a huge maiden all shrouded in linen; that Heaven and Earth are Father and Mother, whose offspring are the living men, beasts and plants; that the moon when eclipsed is hungry, sick or dying; that the stormy winds tear asunder the kings of the forest. Of such stories there is no end. They have sprung up in all races of mankind, whether white, black or yellow; and in all religions, whether Christian, Jewish, Mohammedan, Hindoo, Buddhist, or otherwise. They have flourished throughout the ages known to history, and not yet are they wholly failing.

To this mythology must be added another and still more wonderful domain of mental creativity, which goes by the name of mysticism. This, so far as it has a cognitive basis at all, would seem to depend much upon symbolism. An outstanding instance is the Jewish "Kabbala", where every number, and even every letter of the alphabet, is credited with its own particular metaphysical significance. Similarly, in the Middle Ages each part of man's body represented a different reality of the upper world, the head being Christ,

the hairs Saints, the limbs Apostles, the eye contemplation, and so forth. The Bible itself presents to us the Beast in the Book of Revelation.

But so far in our account of the aesthetic and creative achievements of literature we have seen nothing comparable with what in the case of painting was called self-expression or style. This certainly exists in literature also, but of a very different sort. In particular, linguistic style presents the entirely new feature of figures of speech. Outstanding instances are similes and metaphors. Consider the lines:

"We are such stuff
As dreams are made on; and our little life
Is rounded with a sleep."

With what aesthetic joy must the writer of these lines have brought waking and dreaming existence into mutual relation, perceiving that, despite their seeming to be in abrupt contrast, they still are fundamentally the same!

Here is another charming illustration:

"Her angel's face,
As the great eye of heaven shyned bright,
And made a sunshine in the shady place."

Yet lovelier are the following lines:

"To gild refined gold, to paint the lily,
To throw a perfume on the violet,
To smooth the ice, or add another hue
Unto the rainbow, or with taper-light
To seek the beauteous eye of heaven to garnish,
Is wasteful and ridiculous excess."

These examples have been taken from poetry; but, of

course, prose too is more or less embellished by similes. Consider this passage from Cowper:

"Now for the visit you propose to pay us and propose not to pay us—the hope of it plays about on your paper like a Jack o'lantern on the ceiling. It is here, it is there; it vanishes, it returns; it dazzles, a cloud interposes, and it is gone."

Here every new point of likeness in difference evokes a fresh delight, until this, towards the end of the passage, by sheer intensity, almost stops one's breath.

Essentially resembling similes are the figures called metaphors. Here, also, a comparison is made between something under discussion and something else of another kind, but—paradoxically enough—the latter alone is stated, the former being only implied.

"Why, then the world's mine oyster,
Which I with sword will open."

Here, between the world and an oyster, the difference seems to reach its utmost limits; and yet the poet with such ease brings the two together.

Or recall to mind those enchanting lines of Lorenzo:

"How sweet the moonlight sleeps upon this bank!
Here we will sit and let the sounds of music
Creep in our ears; soft stillness and the night
Become the touches of sweet harmony.
Sit, Jessica."

After thus comparing literature with painting in its main achievements, let us pursue the comparison of these two arts

to their respective fountain-heads. In both alike, the aesthetic worth has two unlike sources, the "classical" pure beauty, which is intrinsic to the material presented; and the "romantic" emotion-play, which that material evokes by way of association. But in general, the literary art is as much advantaged on the side of the emotion-play as it is at a disadvantage on that of pure or formal beauty. We need hardly be surprised, then, to note that the emotions rather than the beauty have usually been its chosen field. Even the French, with all their love for formal beauty, can only show comparatively few authors who have made this aim dominant; for instance, La Fontaine and Racine. As for the English, who incline to be sentimental—so much so that they fear to show it—these seem to have almost deserted beauty as long ago as since the days of Chaucer. Even Shakespeare on his towering height shines chiefly in respect of emotion.

And this antithesis between the French and the English is to be found again between the ancient masters and the modern. Here in the literary art, as in all the others, the general movement has been away from pure beauty and towards the play of emotion. Even the expressly "new" literary art follows along the same route. It is only distinguished by the kinds of emotion to which it gives preference. It turns from the noble to the ignoble. In truth, with its altered ethical values, it recks neither of nobility nor of ignobility as such; but the latter has the practical merit of being less hackneyed; indeed, it is a mine always revealing richer and richer lodes.

As for the quantitative laws that serve the two purposes of

beauty and emotion, these laws, as might be expected, exert their influence in precisely the same way here as elsewhere. The aesthetic delight is the effect of "perfect energising"; and this, as in the case of beauty, has its main sources in the laws of energy, retentivity and fatigue. Elimination of distracting irrelevancies; arrangement with a single focus of interest; reinforcement by repetition; refreshment by change; all these are employed by the pen no less than by the brush.

As regards the reproductions involved, the question is sometimes asked how, out of all the multitudinous possibilities, just the right one actually happens; just that which leads to the highest aesthetic worth? One reason, unquestionably, is that the literary artist—like all others—is continually noting round about him and storing up in his mind precisely those things by which his art is likely to be served. Another good reason is that associative reproductions are largely governed by congruence with the person's emotional mood at the time; this fact obviously does much towards adapting them for aesthetic purposes. And finally a writer possesses, after all, much liberty of choice. As Reid said, our thoughts present themselves to our fancy in crowds and we treat them as a great man treats those that attend his levee; he goes round the circle, paying no mark of attention to the greater part, but bestowing a bow upon one, a smile upon another, asking a short question of a third, and honouring yet another with a particular invitation.

There remains for us now, at the close of the chapter, to see what light this literary art can throw on our main problem, the essential nature of mental creation. Examples of

this we have met in abundance. Of what form is the mental process therein operative?

Passing over the cases that are clearly analogous to those which we have examined already, let us take that of literary similes. In order that these should be effective, the mere calling up and attending to a similar idea is not enough. This idea has still its work to do. Its mission is to transform the idea or percept which evoked it. To Jessica, after she hears Lorenzo compare the moonlight with a sleeper, the moonlight itself must *look different*. It must have had impressed upon it certain characters of a sleeper. In form, then, the mental operation is no other than that through which the rocks were invested by Friesz with the character of soft pulpy masses; or through which the sharp details of nature were imbued by Pissarro and his followers with fuzziness; or even through which everywhere the natural colours and shades of objects are converted into their proper tones and values. To describe this form of operation psychologically, we may say as before that a relation, really observed between certain fundaments (man and his state of sleeping), is transferred imaginatively to another fundament (moonlight); thereby is created as a mental object the correlative fundament, or sleeping-moonlight.

Another case that needs some notice here is the special fecundity of literature in fictitious human characters. Of Shakespeare, for instance, it has been said that:

"No man ever came near him in the creative powers of the mind: no man had ever such strength at once, and such variety of imagination. The number of characters in his plays

is astonishingly great. . . . Others may have been as sublime; others may have been more pathetic; others may have equalled him in grace and purity of language, and have shunned some of his faults; but the philosophy of Shakespeare, his intimate searching out of the human heart, is a gift peculiarly his own."

By what manner of mental process is this achieved? To a large extent the secret here, as we found elsewhere, consists in the simple device of judicious exaggeration. Thus Iago was a villain of similar kind to those that we have actually met, but of greater degree. Sir Percival (Tennyson) outvirtued virtue. Benevolence and simple-mindedness are to be encountered everywhere, but not in the measure that Pickwick displayed them. Many people possess more intelligence than goodness, but the contrast is usually less than it was with Becky Sharp. Throughout, then, the main relation used in order to create a new character is simply that of "more so".

But to delineate character well, a mere exaggeration would obviously be insufficient. The change in one trait requires to be supported by corresponding changes in the others. For we know that all of them are more or less intercorrelated, so that an increase of any of them is obliged—on pain of becoming unnatural—to be accompanied by appropriate alteration (either increase or decrease) of each of the remainder. Now what must the author do in order that the invention of such an extreme and yet harmonious character should become possible to him? He must in his previous experience have observed the correlations of the trait when this is in

ordinary degrees, and now he must apply these correlations to the trait when excessive. Once more, then, we are back at the same form of mental process as before; relations really observed with ordinary degrees of a trait are transplanted to an extraordinary degree, thereby creating the extreme but natural character as the "correlate".

Still, of course, it must be added, such naturalness admits a certain amount of latitude; the portrayal of the character is only confined by it within limits, not fixed precisely. To complete the determination, any of the further factors may be introduced which we have already found to be aesthetically beneficial. For instance, here as elsewhere the aesthetic effect can be enhanced by due regard to the principles of energy, retentivity, and fatigue.

Passing in our inspection from characters to events, the result of psychological analysis is still the same. For example, Alice finds that the eating of a bit of cake makes her grow longer and longer, till she wonders how she will ever be able to stoop low enough to put on her shoes and stockings; here the author is only applying to her the elongative relations which he had really observed before on such things as telescopes. And when Alice in her amazement calls out "curiouser and curiouser", she is but applying to "curious", a relation that she had before observed in such words as greater, smaller, nicer, and so forth. Or take any of the fantastic adventures of Peter Pan; for instance when the tiniest of all the stars in the Milky Way screamed out: "Now, Peter!" Barrie, of course, had often enough heard babies and others screaming out; and now he transplants such action

to the star. Or take the machine which was said to make time go faster, or slower, or even backwards. Wells must very frequently have seen such changes produced upon clocks and watches. To get his time machine, he had only to transfer these changes from the clocks themselves to that which they indicate. An imaginative achievement more wonderful still was the soulless monster of Frankenstein who, after being put together out of fragments of men picked up from churchyards and dissecting rooms, was endowed with life by galvanism. Assuredly, the main relations here involved, that of being put together and that of manifesting signs of life, are familiar enough to everybody. Apply them to fragments of men—also familiar—and you get the monster.

Throughout this art as the others, then, the form of mental process essentially involved in creation is everywhere still the same; it is always the transplanting of an old relation, and in consequence the generating of a new correlate. Of this process, which is the expression of the third noegenetic principle, we find everywhere the greatest abundance. But of anything that transcends this process, there is nowhere the smallest sign. Still, this fact by no means precludes, of course, the need of other processes in *preparation* for this one. As everywhere, so here too, the third principle has at some time or other to be preceded by the second, and this again by the first.

CHAPTER VIII

SCIENTIFIC INVENTION AND DISCOVERY

¶ 1. GREAT SCIENTIFIC INVENTIONS. After the fine arts, and especially after that of literature, we may appropriately pay our next visit to the creativeness of science. For a challenge to do this lies before us in the celebrated saying of Voltaire, that the amazing imagination of Homer must have been at least equalled by that of Archimedes. Everybody is acquainted with the delightful story of the latter, how he sprang out of his bath and ran as he was through the streets, crying out "Eureka, Eureka!" From this outburst we may gather that he had achieved something wonderful even for him. What had he done? As is well known, he had been ordered to find out whether a crown, alleged to be made of pure gold, had really been adulterated with any baser metal. And he had suddenly invented a means to this end, at the moment of getting into his bath. For he observed the water rising in consequence. He perceived that the cubic area of the rise must be exactly equal to that of his immersed body. Forthwith he realised that the cubic area of the crown could be similarly measured by immersing it in water. The rest of his problem—since he knew the weight both of gold and of the baser metals—presented to him no difficulty. Thus the crux of the invention consisted in a measurement being supplied by immersion in water; this was actually observed in relation to his own body and then was in idea transferred

to the golden crown. Here in science, then, is found just the same form of process as in art.

Take any other great invention, say that of gunpowder, which has revolutionised not only warfare but even society and history. No anecdote like that about Archimedes seems to have been handed down about Roger Bacon, or about the Saracens before him, or the Byzantines still earlier, or even the Chinese. Still, no one can doubt but that the origin probably consisted in some one accidentally lighting a wood-fire on a soil which contained saltpetre; the latter would naturally combine with the carbon from the wood into gunpowder; and this, being in a fire, of course exploded. Sooner or later afterwards, the observation must have been made that such an explosion not only caused much flash and noise, but also could propel solid objects with great force. To invent gunpowder as an implement of war, one last and decisive step had still to be taken; it was now needful to pour down this mixture of saltpetre and carbon into a tube closed at the end except for a touch-hole, and then to ram on top of it a ball of iron. Accordingly, the mental process in the mind of the inventor consisted in this, that the property of propelling actually observed in relation to natural situations was applied to the tube situation; with the novel result of a propelling that could be aimed at will.

Next among the greatest inventions of mankind came that of the steam-engine. How it was really invented, nobody knows. But at least the anecdote told about Watt is characteristic of what *might* happen. Supposedly, he noticed the movement of the lid of a kettle of boiling water, and was

inspired by the idea that such an event on a large scale might exert very great force. Here the relation, actually observed between a small quantity of steam and the movement of a light body, is transferred mentally to a large quantity of steam and thereby creates the idea of the movement of a heavy body.

A still later invention—perhaps the greatest of all times—has been that of treating diseases as due to germs (using either the method of inoculation or that of antisepsis). But to do this was, in itself, nothing more than to apply to the germs when supposed to be in the blood the procedure that had been found effective against them when known to be on the laboratory table. Here then, as so often, the really difficult part of the invention did not lie in thinking out the correlate itself, but in preparing for it by observing the relation needed for that purpose. Though the third principle does indeed say the last word, the second one renders the greater service.

So far we have only been considering inventions from their broadest aspect, that which characterises each of them as a whole. But to carry a great invention into actual effect involves usually a great many further inventions with respect to details. And in such problems of smaller scope will often lie the most formidable of the obstacles. Save for these, how easy it would have been to invent, say, a flying machine! A simple recipe would have been to take an eagle capable of carrying a lamb in its flight, and then to build up a machine on the same system of relations but in larger magnitudes until it could carry a man. Something of this

sort was indeed tried over and over again; but with failure after failure. On the other hand, a realisation of the *general* possibility of transferring flight from birds to machines may well have been the essential inspiration of all the would-be inventors. As late as 1901, a learned article (in Chambers's *Encyclopedia*) on flying machines came to a desponding conclusion about their ever being feasible at any time! Certainly, *this* writer would never have invented one.

¶ 2. MECHANICAL PROBLEMS AND INVENTIONS. Turning, then, to these minor and subsidiary inventions, we find that they very largely belong to the sphere of mechanics. This, fortunately, is one where we are no longer obliged to depend on general inferences supported by dubious anecdotes. We arrive, instead, at a matter which has been long and carefully investigated in psychological laboratories. The latest and, I believe, much the most penetrating and illuminating investigation of mechanical ability is that which we owe to J. Cox.[1] The following is a sample of the tests which he has devised:

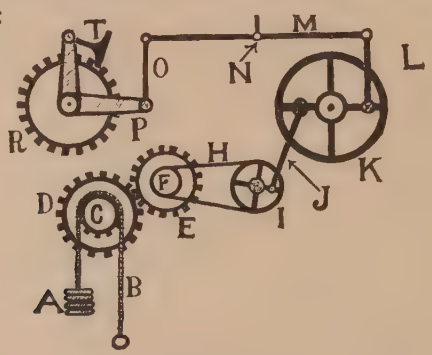


Fig. 6. Cox's diagram.

[1] *Mechanical Ability*, Methuen, 1930.

(*a*) When *B* is let go, what happens to *R*?
(*b*) When *B* is let go, what happens to *K*?
(*c*) When *I* is turned, what happens to *M*?
(*d*) When *P* moves up and down, what happens to *R*?

Of the mental processes involved in doing this test he gives a very detailed account, based on the most reliable introspections of numerous subjects, both expert psychologists and laymen. Here we must content ourselves with the following summary quotations.

He finds that the whole operation falls into three stages:

(*a*) A "specific formulation of the problem", where this is analysed into its subsidiary constituent problems.
(*b*) The "finding of a general method".
(*c*) "Working out and testing the general method."

According to the conditions of the case, any one of these may become the most difficult and important. But for our present purposes, the greatest interest attaches to the stage (*b*), as appearing in the highest degree creative. Of this, Cox says that the search "may be pursued in either of the two following ways":

"(1) Reproduction followed by Eduction (for meaning of this word see p. 34). The presented mechanism recalls some particular kind (or class) of mechanisms known to the subject (sometimes a mechanical model which he has previously solved), and he thereupon reproduces such items as he has learnt to associate with these mechanisms.

If reproduced from a general class of mechanisms, the items are usually vaguely conceived. The subject must then re-examine the specific requirements of the test in order to

give clearer definition to those characters of the reproduced items which bear directly on the problem. In so far as this occurs the process is eductive . . . the more clearly defined characters of the reproduced items are educed as the correlate.

"(2) Eduction followed by Reproduction. This alternative method is by means of correlate-eduction followed by reproduction. One or more of the attributes of the presented items, i.e. the 'characters' and 'relations' of the items, and of their movements, cognised in Stage I, function as the initially given fundament; the relations which the items sought for in the method must bear to these presented items are given in the problem itself, and function either singly or complexly as the given 'relation'. Hence are educed one or more attributes, i.e. 'characters' or 'relations', of the item sought for. The item which is known to have such educed characters then comes by reproduction.

"For example, the subject educes that something 'stiff', 'joining two buttons in a straight line', which can also 'move with the buttons' in a certain observed way, is required, and reproduces a 'rod'; or he educes that something is required that will 'pull' but not 'push', and reproduces 'string'; or again, he educes that in order to connect up certain items the required item must pass, as it were, round corners, and reproduces 'pulleys and string'."

The author next proceeds to compare these two methods carefully with one another. He shows how the option between them has a parallel in all those numerous tests where some essential missing part has to be found. He explains the advantages of the second method and narrates how the first one is usually adopted by subjects whose power of educing is weak.

In general his work demonstrates that here also in mechanical ability the process creative in the highest degree is that which has been called the educing of a "correlate".

¶ 3. SCIENTIFIC HYPOTHESES. The preceding inventions of science have had one notable property in common; namely that, although having been mental creations to begin with, they eventually materialised and could then be actually observed. There remains to consider those scientific creations which never arrive at being observed, never advance beyond the phase of being ideas. Such "hypotheses" are so called to indicate that they merely serve as a foundation upon which —though unobserved themselves—there can be built up a systematic view of the things and facts which do admit of observation.

An outstanding example is the hypothesis of "energy", which was taken over from philosophers and psychologists by physicists, in order to explain the fact that all different forms of physical work display constant equivalencies. For instance, Joule found that one unit of heat was produced by every 1390 foot-pounds expended in compressing air into a receiver. He explained this by conceiving that some kind of force or "energy" passed from the piston to the receiver; in the piston it manifested itself as movement; in the receiver, as heat. When in the form of movement, this energy was expressed as $\frac{1}{2}mv^2$ (where m denotes mass and v velocity). Nowadays, the physicists—or at least those of them imbued enough with philosophy—have had to give up any such explanation of movement or heat by a force; the concept of

"energy" can no longer be assimilated by them. Yet they not only still claim possession of the word, now so useless to them, but even—like a celebrated member of the canine species—deny the usage of it to anyone else; notably the psychologists. And over this bone, there is at present a pretty quarrel going on.[1]

For our purposes here, however, we are not called upon to join in the fray. We need only inquire how the idea of "energy", in the sense of a force residing in physical objects, ever came to be invented. To this question there has never been more than one serious answer. The force is actually observed *in ourselves* and then is "projected" by us into the physical objects. To show in detail how such a projection may be effected must be reserved for chapter XI. But we may be allowed to forestall that chapter here to the extent of saying that the essential process involved is once more that of educing a correlate.

Another interesting hypothesis, or rather set of hypotheses, has been invented in the attempts made to explain the phenomena of electricity. One attempt involves the conception of two fluids, positive and negative respectively; these are such that they may, indeed, be separated; but never can one be excited without a simultaneous excitement of the other. Now all such properties as fluidity, separability and excitability are frequently observed as relations between bodies large enough to be seen. The invention of the hypothesis, then, derives from transferring these relative properties to bodies so small as to be invisible.

[1] *Cf.* chap. IV, p. 28.

Yet another pre-eminent hypothesis is the view of Copernicus about the solar system. He taught that all the other members of this system revolve round the sun. Such circular or elliptic movement has certainly never been humanly observed in the visible heavens. But it has in the case of many terrestrial objects. The invention of the hypothesis consists, then, in displacing the movement from where it is observed to where it is not so. The justification for the displacement lies, of course, in its practical success. After inventing the ideas of stars that gyrate round the sun, the astronomer proceeds to invent furthermore the appearances that such stars would present to us here on the earth. Finally he makes a more or less exact comparison of these invented appearances with those which we actually observe; and finds, in general, that the agreement is passable enough.

¶ 4. SCIENTIFIC DISCOVERIES. There is still another class of scientific results that may put in a claim to be inventive and so creative. It is exemplified in the discovery made by Oken whilst walking one day through the forest of the Harz. He saw on the ground the whitened skull of a hind, and noticed that the base of the skull had a striking resemblance to the vertebral column. Vividly he reports his behaviour as follows: "Picked up, turned about, examined, it was finished! The idea went through my brain like lightning; it is a vertebra".

Now in itself, this perception of likeness between the skull and the vertebra is no more than the educing of a relation;

it has only creativity of the second order. But beyond all doubt Oken's mind went far beyond this. The idea, and even the percept of the skull, must have become more or less changed for him. They must have been enriched by many a character taken over from the vertebra. The case is, in short, analogous to Lorenzo's picture of the sleeping moonlight as described on pp. 92, 95. So the explanation given there may suffice here also.

For another famous example of scientific discovery, we may take the resemblance perceived by Franklin between, on the one hand the thunder and lightning of the sky, and on the other hand the electricity of an ordinary electrical machine. Wonderful as was this feat of comparison, it would by itself have born but little fruit for science. Its enormous significance came in when further relations already known about the electrical machine, such as the charging of different bodies with electricities of opposite sign and the possible increase of electrical tension between them until the insulation is ruptured, were transferred to the phenomena in the clouds where they were *not* known.

Another celebrated discovery is the likeness which Priestley detected between the appearance of burnt mercury and that of rusted iron; in either case, there was a conversion of metal into red powder. This, too, would have been of little service, had he not gone on to apply further relations from where they were already known to where they were not so. To conclude, of course, he had to make a check-up of appearances analogous to that described in the case of Galileo.

Some peculiar features are presented by yet another

classical instance, the likeness detected between the fall of an apple (or other heavy body) to the ground and the mutual attraction of the celestial bodies. Here the likeness between the two percepts was by no means a gross sensory one as in our preceding example. Before it could have been noticed, the percepts themselves must have been profoundly altered by long previous meditation. The apple, earth, sun and stars, these, like the skull of Oken, must have looked different.

Further illustrations could be cited without end. One such is Harvey's perception that the valves of the veins resemble those of a pump, whereby he arrived at discovering the circulation of the blood. Or Davy's classification of alkalies with oxides of metals, because both have the property of neutralising acids; by which path he eventually arrived at identifying hydrogen, the lightest of all things, with the metals which are the heaviest.

But strangest and most dramatic of all is the very recent case of physical relativity. The astonishing observation has been made that the velocity of light remains always equal whatever may be the motion of the different bodies from which it emanates. On the basis of this detected similarity between different bodies, physicists have proceeded to transplant further relations from some of these bodies (where they are really known) to others (where they are not). In this manner have been created novel conceptions of the universe, which in due course, as in the case of Copernicus, give occasion for checking up the educed appearances with those actually experienced. But this time the novelty is so extraordinary, so upsetting to long indurated dogma, that the

effect on physicists, philosophers, theologians and so forth is like nothing so much as that of a gunshot on a field covered with feeding birds. All affrighted rise screaming into the air, wheeling by flocks, coveys and bevies in every direction. In a word, most writers seem to be passing from the stupor brought on by the physics of Newton to a delirium excited by those of Einstein.

But we have here no space for further dwelling on the theme. Enough has been said, it is hoped, to show that heaven-wide apart as are the fine arts and the sciences in some respects, in others they touch each other. Both are composed of precisely the same ultimate elementary processes, those described in chapters III–IV. And, in particular, both alike attain their supreme degree of creativity by virtue of the process which has been called the educing of a "correlate".

CHAPTER IX

BEHAVIOUR

¶ 1. ADAPTATION OF BEHAVIOUR. After the fine arts which delight our life and the sciences which illumine it, we may naturally pass on to the behaviour which maintains it in safety. For behaviour, too, can and has put forward a claim to be originative, inventive, creative. And such a claim can scarcely be disallowed. If it be legitimate for him who composes a picture or a melody, why not for him who plans a campaign or devises a political constitution? And in point of fact even the most ordinary course of natural events soon leads us to pick out one person as managing his affairs with far more originality than another.

Behaviour itself, however, is divisible into two kinds, which may be called respectively impulsive and deliberate. The first kind includes all that we execute by innate tendency. Reflexes come in here (if we entitle these "behaviour" at all), including such movements as those of sneezing, coughing, hiccoughing, shrinking from painful contacts, or accommodating the pupils to bright light. On a higher level come such actions as turning the head to a light or a noise, blinking the eye at an object which threatens to touch it, eating, drinking, walking, fighting, and so forth. But up to this point, the behaviour would seem to do no more than follow a prearranged plan; it is not taken by any one to be inventive.

To another class of irreflective actions belong those acquired by habit. Here would come all such motor dexterities as

bicycling, typewriting, tennis-playing, doffing hats, opening letters, dodging taxi-cabs, kissing relatives and so forth. If such actions are entitled inventive at all, it is only when they are first acquired. Genuine habit and genuine invention are surely the antipodes to one another.

Passing over all such cases where behaviour is either dictated by inherited disposition or else has been fixed by previous behaviour in similar situations, there remain those other cases where the individual has to shift for himself. The situation is new for him, so that he must by hook or by crook adapt himself to it. To such adaptation it is that the title of "inventive" has been applied most commonly and most plausibly.

Such cases we will accordingly consider. The situation presented may be of two different types; either psychological, or physical. In the former, the material upon which the person has chiefly to work consists in the thoughts, feelings and desires of the people concerned. In the second or physical type, the material consists in the solid objects at issue; and here the situation may eventually reduce itself to a demand upon mechanical ability, as considered by us already. Most commonly, however, situations include both psychological and physical material closely interwoven.

¶ 2. EXPERIMENTS OF STRASHEIM. We will commence with an almost purely psychological situation. Here again, as in the preceding chapter, we shall have the inestimable advantage of dealing with an experimental investigation. It is the outstanding work of Strasheim. The general scheme

of this consisted in putting the subjects into some (imaginary) situation and giving them a way of solving it. They were then placed in a number of other situations increasingly unlike the original one, but still soluble on the same general lines as before. The point was to discover the limit where the novelty was so great that the human mind failed to cope with it successfully.

The original situation together with its solution was conveyed in the following story, read to thirty children ranging from five to ten years of age, half being picked out as specially "bright" and half as specially "dull".

"One day some boys wanted to play football, and so Tom and Dick, the two biggest boys, were asked to pick sides. As they had no money with which to toss for first pick, they had to find another way. One saw some pieces of paper on the ground, took two, and made one piece shorter than the other. He then held the two pieces in his hand with only the tops sticking out, so that his friend could not see which piece was the longer. He then said to his friend: 'If you draw the longer one, you shall have first pick'."

Afterwards the children had another story which presented the same situation (in other words), but omitted the solution; this latter the children had to find for themselves. In the third story all was similar, except that instead of "some pieces of paper" being reported to lie on the ground, only "some paper" was said to do so. In the fourth story "some paper" was replaced by "an old exercise-book". The fifth story expressly said that no paper was lying about, bu incidentally mentioned that the children had with them their

lunch wrapped in paper. The next story said that no paper was to be had in any way, but mentioned that a few sticks were lying on the ground. The next did not even provide the sticks, but casually mentioned that a box of matches was to hand. The next failed to supply even this. It ran as follows:

"One day some men wanted to play Cricket; so they undressed, put on their cricket togs, and went out to the field. They had of course to toss to see which side should go in first; but when they looked for a penny to toss with, they found they had forgotten to bring money with them. They looked all over the ground, but could find neither paper, sticks, nor matches."

The next or ninth story made a greater call than ever upon the children's power to invent a substitute for the original pieces of paper:

"One very hot day two fishermen were out at sea in a little boat fishing. They were very thirsty but there was only enough water for one man. So they decided to toss to see who should have the water. But they had no money to toss with and there was no paper."

In the tenth and last story, the situation needed a still wider jump from anything experienced previously.

The next part of Strasheim's experiment consisted in analysing the mental operations involved. This was done, partly by means of the introspection of some subjects old enough to supply it, and in the case of the children by means of carefully studying their answers and mistakes. The result

was to show that the whole operation could be divided into three phases, which, however, were more or less overlapping.

The first phase was mainly *the eduction of relations*; it consisted in understanding those which were essential elements of the original story. Of these there were four:

(*a*) that the pieces of paper should be two in number;
(*b*) that they should be of unequal length;
(*c*) that their lengths should be concealed;
(*d*) that a choice should be made between them.

For the subsequent procedure, further relations—some of "higher order"—became involved. Of all these the author gives a detailed analysis. Even the easier of them proved to be beyond the powers of the children under five years.

"The following is an account of the behaviour of one testee: When asked to 'show', she picked up all the pieces lying on the ground, and put them into her hand.... She was again told what to do. This time in 'showing' she did pick up two pieces, but did not 'make one shorter'. On being encouraged with the words, 'And then, and then!' she slowly and hesitatingly tore a piece from the top of one of the bits of paper protruding from her hand (i.e. there was no attempt to arrange the pieces so as to make them look the same; they were left just as she had originally put them into her hand, so that the shortened piece just emerged from the hand, while the other protruded a long way). After some further urging, she herself (i.e. without holding out her hand to the experimenter) chose the larger piece—clearly a bare reproduction of what had happened when the experimenter showed the procedure."

The next phase of the whole operation is mainly *reproduction*. In the ninth situation, for example, the children had to recall from their previous experience some or other substitute for the paper, as twigs or matches. Actually they made such suggestions as "two pieces of seaweed", "two pieces torn from their handkerchiefs", or even "fish". These were the sort of reproductions that ensued after an adequate performance of the first phase, that of educing relations. When this first phase had been done *in*adequately, then the reproduction tended to be of a different nature; it recalled rather the original situation as a whole including all its irrelevant details. In the fourth situation, for instance, one girl of five years

"actually first removed a whole page of the exercise-book, folded it across the middle and tore it into two. She then folded one of these halves down the middle, and continued till she had the pieces she wanted (they were still rather too large to be properly covered). Now when she entered the room where the experiments were being carried out, she had chanced to see the experimenter preparing his material in this very way. We have here again, therefore, this wholesale transference of items from one 'situation' to the other, without the abstraction of the essentials."

The third and final phase consisted in applying all the available information—both that which is given in the situation and that which is reproduced by memory—to the mental construction of some responsive behaviour. Its essence was to transfer relative characters (perceived previously) to other fundaments (given in the present situation); that is

to say, it consisted in *educing correlates*. The main difficulty of the transfer proved to lie in effecting it completely. The common fault was to omit some or other of the relations that were needful. For instance, many children got their two bits of paper of unequal lengths right enough, but then presented these to the chooser without concealing the lengths from him.

In general, it was found that the first and third phases—the educing of relations and of correlates—were done best by the bright children. Whereas the second or reproductive phase depended rather upon age.[1]

¶ 3. EXPERIMENTS OF LAYCOCK. Let us go on to another experiment, one which was on a very large scale. It is that of Laycock. Here again situations were presented by means of stories. But after the subjects had attempted to solve the situation, they were submitted to special courses of training and then had to try again. The training consisted in showing the subjects how to solve a series of situations that bore an increasing likeness to that which they had had to solve for themselves (in Strasheim's work, it will be remembered, there was an increasing *un*likeness). After five experiments on comparatively small scales and with subjects of varying ages, the main one was undertaken with 919 boys of 11 and 12 years of age.

[1] These results, which I have ventured to quote from the works of Strasheim, form but a very small part of all that he gives. For this, reference must be made to his work itself, *A New Method of Mental Testing*, Warwick and York, Baltimore, 1926.

The first situation which had to be solved was entitled, The Capture of Babylon. The following story was read to the children:

"In the year 559 B.C. Cyrus, King of Persia, set out to capture Babylon. Babylon was a great and mighty city situated on the great river Euphrates which flowed beneath the walls through the city. The walls were very thick and were 300 feet in height—that is, they were as high as the clock tower of Big Ben at the Houses of Parliament. When Cyrus arrived he found the gates shut and the guards on the walls looked down and laughed at the Persian army while the rest of the city paid no attention to his coming and gave themselves over to merriment.

What was Cyrus to do?

Question. Make a list of the different ways in which you think Cyrus tried to capture the city, and put a cross opposite the one you would have chosen."

Next, the children were told that, for various reasons, all possible solutions were ruled out save only one; this they had to discover. For instance, the walls were too high and strong to be scaled, or battered down, or undermined.

Then came the first training story, which contained, but in widely different circumstances, the relation which was eventually to bring about the fall of Babylon.

"During the Wars of the Roses the Lancastrian army had been beaten by the Duke of York, and King Henry VI and Queen Margaret and a few others had fled from the field. The Duke of York sent a group of soldiers in hot pursuit hoping to capture the King. When the King and Queen came to a forked road they chose the right branch but, fearing that the

pursuing party would catch them, a trusted servant was left behind who pretended to be worn-out and ill. When the Duke's party approached, the servant was seen painfully dragging himself down the left branch of the road. When captured, he begged for his life and promised, if spared, to tell them the way the King had gone. He then led them down the left branch of the road and meanwhile his beloved King escaped."

To make sure that the story was really understood by the subjects, it was followed by some questions upon it. These —it may be said here, once and for all—were almost always answered quite correctly.

Then followed the second training story:

"A soldier in France used to sleep in a room next to a storeroom where kegs of beer were kept for the use of the officers. The soldier was very fond of beer, but the storeroom was kept securely locked. Finally he found out that by boring a hole through the wall and through the barrel that was up against it, he could insert a little pipe and draw off beer whenever he wished. Soon it was found out that beer was being stolen and the man in charge of the keys was blamed and punished. The keys were put in charge of someone else but still the beer disappeared. Then one of the officers kept the keys himself but the large barrel where the beer was kept seemed still to be interfered with. Finally a search was made and the trick discovered. The soldier had been having a jolly time with his beer for months and when the Captain heard of it he laughed so heartily that the soldier was not even punished."

Then the third:

"Bill Johnson was an Englishman who went to Canada to farm. He picked out a homestead or farm in Northern

Ontario and built his house by the Nipigon river. One day an Indian told him that there were plenty of gold nuggets at the bottom of a deep pool in the river if he could only get them. So Bill dug a ditch and drained the river off into it so that the old channel was left dry. At the bottom of the pool he found a great number of gold nuggets so that he became very rich and was able to come back home a wealthy man."

And then the last:

"Mr Brown and Mr Jones were farmers whose farms lay side by side. Brown had a fine stream of water running through his pasture field at which his cows used to drink. At one point the stream ran very close to Jones's pasture field but Jones had no water in his field. As Brown and Jones were great friends, Jones was allowed to dig a large ditch so that the water could flow through a corner of his field and then back into Brown's field again. In this way, the two friends both had plenty of water for their stock and they became closer friends than ever and used to help each other a good deal."

As the reader of the present volume is probably well aware, Babylon really was captured by diverting the river from its course and simply marching into the city down the dry bed. The critical relation, then, was that of *diversion*. This in the training stories was first applied to baffle the pursuit of the king. It was then utilised to steal the beer, so that here already the diversion was that of a fluid. And in the two following stories the diversion was actually that of a river, so that the likeness to the case of Babylon became extremely close.

Nevertheless, the training effect of these stories, measured

by the degree that the situation was better solved after the training than before it, proved to be astonishingly small. A control group who had no training made on second trial 5 per cent. of all the improvement possible; whereas the group who had undergone such seemingly ample training made the very little greater gain of 9 per cent.

A natural idea to explain this lack of success might be that, although the critical relation of diverting, and even of diverting a river, was no doubt understood, still it was not extracted from its context and given separate emphasis. But Laycock took steps to measure this influence. With one of the groups of subjects, the questions asked after the stories were specially framed so as to extract and emphasise this critical relation. Thus, after the story of Brown and Jones, the question ran:

"The following sentence is completed by one of the four groups of words listed below it. Put a cross opposite the group that BEST completes the sentence.

Jones got water for his stock by—

(1) Changing the course of the river into a new channel.
(2) Digging several wells in his fields.
(3) Hauling water in water-carts.
(4) Buying a new farm where there was water."

Almost all the children correctly indicated the first of these sentences; that is to say, the one in which the needful relation is explicitly mentioned. Even with this group, however, the gain only amounted to 11 per cent.

Another possible suggestion is that the smallness of the effect of the training stories might be due to the children not

regarding them as such. To ascertain this point, one group was expressly warned of this several times, the words used being: "The following stories may help you to find out how Cyrus captured Babylon. You will be given another chance at the end to say how you think Cyrus did actually capture the city". But this extra stimulus only produced a gain of 19 per cent. On combining (with another group of subjects) both these aids, the emphasis on the relation and the hint to use the training, the gain rose to 34 per cent. But even this amount would appear remarkably small. Before actually trying the experiment, something like 90 per cent. seemed to be reasonably expected.

The work of Laycock covered a large amount of ground not mentioned here. There was a whole further experiment, where the situation was almost purely psychological and the relation of diverting had to be applied to "attention"; yet another experiment, where the situation was wholly physical; and in each case there was a personal interview with each child, to ascertain the chief sources of the ideas which he had expressed. Such an array of facts were gleaned and such fundamental conclusions were drawn as would appear to render this research very notable in educational psychology. But for all this, reference must be made to the work itself.[1]

For our present purposes, we are only concerned with ascertaining the form of mental process essentially involved in such cases of adaptation to new situations. First of all—just as we saw with Strasheim—there comes a phase of

[1] *Adaptability to New Situations*, Warwick and York, Baltimore, 1929.

examining the situation, a phase which mainly consists in understanding the relations presented. How well this was done in the experiment was shown by the already mentioned fact, that the questions after each story were almost always answered correctly.

After this first phase of examining the situation, there follows that of assembling further information. This means that the subjects have to recall all they possibly can which has any bearing on the subject. The phase is above all things one of reproduction. But it does not concern us for the present, because the essential idea, that of diverting a river, did not need to be recalled; it was openly given in the training stories.

There remains the third and last phase. Upon this, it is—seeing that the other two had comparatively little influence—that the main responsibility for the failure of the subjects must needs devolve. This last phase consists in applying the relative character of diversion to the case of the river which ran through Babylon. And how easy this operation seems to be when once it is known! I at once think of the river-bed as laid bare and dry; it lies as an open road right into and through the city; the Persian soldiers are streaming along this road and sweeping away the handful of Babylonians who attempt in vain to stem their onset, while the rest of the inhabitants flee shrieking away. What could be less troublesome than to realise all this? It consists in nothing but transferring actions well known in previous situations to the situation now confronted. Then why could not the children do as much? One might suppose, because of their being so young.

But after all, the age of 11–12 is within two or three years of full grown "intelligence" ("g"). Moreover, Laycock made some similar experiments upon students who were twenty years old and more. They did indeed get higher scores, but not very much so. One must conclude that such operations are much more difficult than at first sight they seem to be. Investigation is urgently needed into the conditions upon which this difficulty depends.

For our present purpose, however, it is sufficient to find that here also, in the case of behaviour just as in that of the arts and sciences, the final and most creative step consists in nothing less, but also nothing more, than the process of educing correlates.

CHAPTER X

UNREALITY

¶ 1. PREPOSTEROUS THOUGHTS AND PERCEPTIONS. In the last chapter we arrived at the mental operations which govern our responses to our environment. We will now turn to the opposite extreme, those which lead us away from contact with our real environment into the domain of unrealities. And here more than anywhere—more even than in the sphere of the fine arts—would seem to be afforded the fullest scope for mental creativity.

One great class of unrealities begotten by man consists of what are called his delusions. The following letter, written by a hysterical girl in a mental hospital, is an extreme instance:[1]

"My dear Mamma—It is time that I leave to return home. I have been tremendously changed for the better. I think papa will be able to get me a commission under Garibaldi before long. There are three to whom I am specially indebted—one Mr C., the modeller, the other the doctor, a Eunuch, who modelled me at the fire, and attended on me and bathed me. He is, I am sure, a gentleman, a splendid doctor. Could not papa get him into a regiment abroad? And there is the nurse. Could not papa get him any situation away from Morningside Asylum where I am at present? I should like papa to come for me as soon as possible. Do you remember the verse, 'There are', etc. (12th verse, 19th chapter of Matthew). About Eunuchs? Then I beg to

[1] Clouston, *Mental Diseases*.

inform you that according to Scripture and my conscience, Jessy, your cook, is a man; and Janet, the mad devil, is a man; and D., and H., boys who can have children. Aunt I. is a man, and yourself also, both made of men, and I am a boy, made of Dr C. and Dr Z. Mrs T. is a man, made of men. They are very ignorant on this subject here; but as for me it is certain that at least the spirits have showed me, which Christ sent when I was under drugs; they showed me this. I have at times since I came here passed the shadow of death, and therefore am authorised to speak in opposition to all men and women, gentlemen and ladies who oppose me. I am, I can swear, as you want to know what sex I belong to, a mixture of a nymph and a half-man, half-woman, and a boy, and a dwarf, and a fairy. I know more than my fellow mortals, having expired eleven times before the time.—I am," etc.

When not, as in the preceding case, turned towards sex, our delusions mostly take the direction of supposing that we are less well treated than we deserve. Mental patients commonly push this to the length of supposing themselves to be maliciously persecuted. Passers-by in the streets are taken to be whispering about them and plotting against them. They are being followed by the police. Their food or the air of their rooms is believed to be poisoned. Somebody is working an electric battery to annoy them. Their wives are unfaithful, and their children are being tortured by villains.

Another type of mental disorder, having much the same inward significance but conceived more optimistically, is that wherein we rate our excellences and fortune higher than other people are disposed to do. A patient will become convinced that he is the strongest man in the world, is forty

feet high, is God, and has "a damnable heap of money". Or else his egoism may dress itself more subtly; he may take himself to be the greatest sinner in the world, to have neither stomach nor brains, to be unfit to live.

A still stranger class of morbid unrealities consists of those which are not merely believed but—seemingly, at least—are actually perceived by the senses. These are called illusions or hallucinations. The former term is used when the perception is believed to derive, in part at any rate, from some real stimulation of the sensory organs, which is then misinterpreted into something very erroneous. Whereas a hallucination is that which has no basis in any real sensory stimulation, but instead springs from a wholly subjective source. Still, between the two types of case there is no possibility of drawing a sharp boundary line, and rarely is there much need for making the division at all. A characteristic example is supplied by the following letter of a male patient of Clouston:

"Record of Miracles. The Reverend - - - came to see me, and his countenance changed to that of my deceased uncle - - - . My length while in bed was increased to about seven feet, and then made normal. When in bed a very pretty coloured landscape, including cottage and woman at her washing tub, appeared on the wall. The picture could not have been produced by the aid of the camera. P. Smith, casting a wry look at me, jumped from the floor to a height of a foot, then passed through a framed picture without injury thereto, and through a solid 14-inch stone wall, then came through the water-closet floor to meet me. While peering in at the laundry windows a number of the girls' clothes

flew off them while at their washing tubs, and after about half a minute's nakedness their clothes came back to them, and they were properly fastened without their aid. Near Myreside Cottage, James S., astride a thin wire fence, was seen speeding along for about 100 yards, the wooden posts forming no impediment to his 'wiremanship'," etc.

As is the case with the delusions, so too the hallucinations, when not erotic, are very often persecutory. The sufferer hears voices accusing or threatening him; he may see a hideous old woman in a red cloak who advances and strikes him to the ground; or he may be haunted by pestilential odours. Many other pathological hallucinations are of a religious nature. Engelbrecht relates how he was carried by the Holy Spirit through space to the gates of hell, and then borne in a golden chariot up into heaven, where he saw choirs of saints and angels singing round the throne, and received a message from God, delivered to him by an angel.

Especially prolific in causing hallucinations is the use of drugs; most familiar, of course, being the inordinate consumption of alcohol. At times, the effects are pleasant enough; fair faces, lovely landscapes, or exquisite music. But far more often, the experience is very unpleasant indeed. Formerly, the sufferers used to be most plagued with visions of vermin, such as rats and cockroaches, swarming over them. But keeping pace with the times, a larger and larger rôle in the molestations is played by scientific apparatus. More felicitous, on the whole, are the effects of haschish, whose devotees often report having enjoyed beautiful girls

and luscious wines in a visit to Paradise. Particularly interesting is the influence of this drug and of opium on the apparent dimensions of space and time; things may look much larger than usual, or much smaller; duration may be so drawn out that what is ordinarily experienced in a few minutes may seem to last for thousands of years.

The preceding cases of unrealities—delusions, illusions, and hallucinations—have been frankly pathological; they have been intimately connected with disorders of the body, and in particular of the nervous system. But there are many other cases, especially of illusions and hallucinations, which do not manifest any such pathological character, nor even any particular physiological origin; and yet they deviate widely from the course of psychic experience which we commonly regard as "normal". Recently the proposal has been made to designate the science of these abnormal phenomena as that of "parapsychology".

One familiar instance is afforded by the state of mind known as hypnosis. In such a state, illusions and hallucinations can be created almost without limit, as has been freely exploited in public exhibitions. The hypnotised person may, for instance, be given a raw turnip to eat and some paraffin oil to drink, whilst he is told that these are the choicest viands and wines handed to him at the most fashionable restaurant. He will proceed to take his meal with every outward sign that all appears to him just as is said. If instead, he is told that he is at sea in a storm, then there will be a most vivid display of stomachic discomfort; indeed, if the experiment be incautiously pushed too far, there may be gross physical

manifestations. Especially interesting are the hallucinations called "negative", when the subject is *forbidden* to perceive something that really is stimulating his senses. As a very practical application of this fact, hypnosis can be used to charm away even severe headaches. In similar fashion, teeth can be extracted without any signs of pain. But wonderful as are these hypnotic unrealities, it is still questionable how far they genuinely manifest what we are seeking here, that is, creativity. For after all, the subject only perceives things in the manner that he is bidden. In a sense, then, he remains only imitative.

Less exposed to this objection, however, are the cognate states of somnambulism and trance. The following is an extract from a typical conversation with a medium in this condition:

"Tell me what you see, or describe any one whom you see near me. I will answer yes or no; no more."

"I see a man, very old, tall, with a long white beard and long hair."

"Yes."

"The beard is very white indeed."

"No. Go on."

"He has a very high, broad forehead, and his eyes are drawn down. Why, he's blind."

"Yes."

"And his face is black and blue. And (here the medium shuddered violently)—oh! what's that in his mouth? It's like slime—and mud—and oh! blood."[1]

However, even such accessories as hypnotism and trances

[1] *Proceedings S.P.R.* XI.

are by no means indispensable for producing hallucinations. The following question was very widely circulated:

"Have you ever, when believing yourself to be completely awake, had a vivid impression of seeing or being touched by a living being or inanimate object, or of hearing a voice; which impression, so far as you could discover, was not due to any external physical cause?"

Of 27,329 answers received, 12 per cent. were in the affirmative. And in the great majority of cases, the percipients appear to have been in perfectly normal states of mind and body.[1]

The following two reports are peculiarly interesting as both cases were afterwards investigated experimentally by such a competent psychologist as Lillien Martin.[2]

I. "I was reading with much interest in the *Principles of Chemistry*. That I was awake I am quite sure, as my sister had just passed through the room and we had spoken. Quite suddenly the book seemed to disappear, and in its place came the appearance of a man, head and shoulders. He wore a battered sombrero and soft dark shirt, open to the second button.... The smile, somewhat superciliously amused, grew broader, and then he slowly faded away and the book blurred back into place. I finished the sentence and the paragraph."

II. "I was awakened with a start at 2.15. When I opened my eyes I saw my ghost, which I had often seen before, standing in my window. He has a high forehead, very

[1] *Proc. S.P.R.* x, 1894.

[2] "Ghosts and the Projection of Visual Images", *Amer. J. of Psychol.* xxvi, 1915, 251–257.

hollow eyes, which appear to be only black blotches. His eyebrows are very dark; nose large; very sunken cheeks, and a very prominent chin.... The ghost never brought any messages. The idea of carrying an umbrella in the middle of summer! That's all the sense my ghost has. He came bouncing in with an umbrella last night. He closed it as he entered through my window. He was so busy seeing if he could find any holes in my stockings, that he forgot to take his umbrella with him when he left. I couldn't find it any place in my room this morning."

Another class of cases which has much more frequently had the benefit of experimental treatment is that of crystal vision. This seems to have been practised from the earliest times; by the Assyrians, Persians, and Egyptians; the Greeks and the Romans; as also the Indians, Chinese, and Japanese. Here the subject makes his mind as blank as possible, and stares continuously at a crystal (or some other small bright reflecting object) against a dark background. In a few minutes many people begin to see pictures. The following is an example supplied by Morton Prince:[1]

"Miss X looked into the glass globe. She saw an old lady standing in a very steep street leading up over stones; there were steep rocks on one side. The street was like nothing she had ever seen before in this country. (She said *this* country as if to emphasise the fact that it looked foreign.) She had never seen the old lady before. As she looked, a man on horseback appeared, and the horse knocked the old lady down. The latter seemed to be hurt."

We may pass on to the class of cases which—thanks to Freud and his followers—has been raised to the pinnacle of

[1] *Clinical and Experimental Studies in Personality*, 1929, p. 320.

public interest. It is that of dreams. Here it will be sufficient to quote the dream of Freud himself which he has brought forward as being the very type that he has in mind:

"A great hall—many guests that we are receiving.—Among them Irma, whom I at once take aside, in order to answer her letter forthwith, and to reproach her with not having yet accepted the 'solution'. I say to her, 'If you are still in pain, it is really your own fault'. She answers, 'If you knew what pain I have in my neck, stomach, and body; it seems to tie me up!' I have a fright and look at her. She looks white and puffy, and I think, at last, after all I see something organic. I take her to the window and look into her throat. She makes some resistance, as women do who have artificial teeth. I think to myself, She has no need to do this. Then her mouth opens properly, and I find on the right a large white patch and elsewhere I see remarkable crinkled structures, which evidently follow the shape of the muscles of the nose, whitish grey crusts. I quickly call Dr M. to us, who repeats the examination and verifies it. . . . Dr M. looks quite different to what he usually does; he is very pale, limps, and has no beard on his chin. My friend Otto now stands beside her and friend Leopold tries percussion on her back and says, She has a dull sound low left, and also shows an infiltrated portion of skin on her left shoulder (which, in spite of her clothes, I notice as he does). . . . M. says 'No doubt, it is an infection. But it doesn't matter. There will be dysentery, too, and the poison will be eliminated'. We know also where the infection comes from. Friend Otto not long ago, when she felt unwell, gave her an injection with a propyl preparation, propylenes, propionic acid. . . . Trimethylamin (the formula for which I see printed in thick letters before me). Such injections are not made so easily. Probably, too, the syringe was not clean."

For completeness, there must be added to the dreams of the sleeping those also that occur in wakefulness; especially, since these latter have risen into such great importance in connection with "schizophrenic" mental disorders and "inferiority complexes". Most commonly, these dreams are, as Freud declares sleeping dreams to be, the fulfilment of wishes. But they have a naïve frankness totally opposed to the repression and disguise said to occur in psycho-analysis. The following is an example:

"One of my day dreams was that I could live in a lovely castle. Eat good food, fruit, and vegetables. And be a fairy and have a wand. I could have a hundred houses full of twenty-dollar bills. And ride in a lovely diamond flower team. Have as many dolls as I would wish. And have doll carriages dressed in silk. It would be summer all the time. I could have white silk dresses, pink, blue, and bright gay colours. I could have as many boys and girls to play with me. And I could have story-books."

A case of the rarer and pessimistic day-dreams is the following:

"When I am sewing or reading I begin to think. I think and think about everything until I think about something I cannot get off my mind. One thing I dream about most is the end of the world. I wonder what will become of the people and how the earth will look and how dreadful it will be."

¶ 2. FORM OF GENERATING PROCESS. So much for the content of the unrealities that tenant the human mind. But how do they get there? Of what nature is the material from which

they originally spring? And what is the form of the processes by which they do so?

Take our first example, where the girl swears that in sex she is a mixture of a nymph, man, woman, boy, dwarf, and fairy. Of course she must have met, or at least heard of, all such beings; and in relation to each she must have conceived the appropriate sex. But in her delusion she simply applies all these sex-attributes to herself.

Turn to the case where a man hallucinated that the clothes of the girls "flew off them". He must many a time have seen birds flying off their perches, sparks flying off beaten red hot iron, and so forth. All he did in his insane visions was to transfer these attributions to the clothes and the girls.

As for Engelbrecht, who saw "choirs of saints and angels singing round the throne", one may be confident enough that his saints and angels were modelled after the appearance of familiar human beings, probably with exaggerated expressions of devoutness.

Of unusual scientific interest is the dream of Freud, since he proceeds to make a minute analysis of its actual origin. For instance, the reluctance which in the dream was shown by Irma to having her mouth inspected had really been shown by a governess some time previously. The dream merely displaces the relation to Irma. Again, the diphtheria which the dream assigns to Irma was only a transfer from an intimate friend of hers. The pallor, lameness, and beardlessness attributed in the dream to Dr M. belonged really to a brother of his. Of analogous foreign origin was the incident of the propyl preparation.

Even more conclusive than such analysis based upon reminiscence are those which result from actual experiments. A subject of Vold, for instance, was made to go to sleep with a glove on his right hand, and was observed to awake with this hand lightly touching his right temple. He had just been dreaming, he said, that he was a soldier making a salute. We see here that the relation of saluting, which in his previous experience had characterised certain tactile sensations engendered by military drill, is now displaced over to other kindred sensations caused by the sleeping attitude.[1]

Similar but more dramatic were the results obtained by Spitta, when water dropped into the open mouth of a sleeper caused the latter to dream that he was swimming; whilst a handkerchief laid over his mouth made him dream that he was being buried alive.

¶ 3. SENSUOUSNESS. It is time to make good an omission which will not have escaped the notice of the attentive reader. In this chapter we have put on much the same level unrealities cognised in two very different ways; those represented by thought, as in the case of delusions; and those presented by the senses, as instanced in hallucinations. But are these two unrealities in truth and for our present purpose equivalent to one another? Are not rather the hallucinations the more highly creative of the two? For its products, instead of being mere beliefs, are actual full-bodied perceptions just like those of ordinary life. It seems, then,

[1] *Ueber den Traum*, 1912, II, p. 537.

incumbent on us to say a word as to how these two are interconnected.

On this problem extraordinary light has been thrown by Morton Prince. He found a woman who both experienced hallucinations and wrote automatically (that is to say, without awareness of what her hand was writing). The following is an example of the results obtained from her, where the part of the script in brackets is that which was being written by her at the very time she was having and describing the relevant hallucination.

Script	Hallucination
Subconscious	Conscious
"I was at Harvard (University one day with Dr Jones when I changed into Juliana for Dean Smith and he) was pleased with me.	"I see Harvard University. The steps going up and the brown stones and the whole front of the building. I see myself as Susie going up the steps and into the building and I go down the hall to Dr Jones' office. Dr Jones is there and Dean Smith. They rise and shake hands and then sit down. I sit down as Susie and I see myself sitting in a chair and I turn into Juliana. I rise again as Juliana and shake hands again. They seem pleased. (The whole vision is like a movie.)

Script	Hallucination
Subconscious	Conscious
"I went (through all sorts of gestures as Juliana and)	"I see myself sitting in Dr Jones' office as Juliana and I am going through all sorts of funny gestures like a foreigner. They laugh. (I cannot hear them.)
"I spoke 'lingo' for (the men and they seemed very much interested and the Dean never) took his eyes off of Juliana."	"I see myself as Juliana and I am talking the 'lingo' —(I can hear the words— but cannot tell what they are). I can hear Dr Jones' voice as if he is saying this is 'an interesting phase' (the exact words)."

The following is another example, but in a more poetic vein.

Script	Hallucination
Subconscious	Conscious
"Open wide thy treasure chest ladened with gifts so rare. "And sing thy song of rapture of beauteous skies so fair."	"A big chest rises up in my mind—it is heavily carved —a gorgeous thing. At first it is closed and then it slowly opens. As it opens I see that there are in it beautiful strings of pearls and red and white roses. I see vials like cut glass flagons, and instead of seeing the liquid perfume in the flagons there comes out

Script	Hallucination
Subconscious	Conscious
	a sort of vaporous cloud that is perfumed, because I can actually smell it. And on the edges of this chest are beautiful birds, like pure white doves. They are alive and it seems as if I hear them cooing as in the spring-time. I actually hear them coo. Then, finally, a foggy vapour seems to cover the whole, to swallow it up, and it disappears. (It all seems to symbolise beautiful things.)"

After very careful and full investigation, Prince concludes that the hallucinations were a "bursting into consciousness" of subconscious images, understanding by "images" what Galton described as such (see p. 8).

Prince found further that the images themselves had originated in a "deeper source", that of subconscious *thought*.

From this and many other pieces of evidence, we seem obliged to conclude that hallucinations are essentially the same thing as images, only pushed to a fuller degree of sensuousness.

How physiologically the sensuous character ever comes to be imparted to mental content otherwise than by the usual way of stimulating the sensory organs is quite another

question. And the answers proposed run in widely divergent directions. Some authorities defend a theory of "refluence". They admit that usually the path of nervous conduction is from sensory organ to the sensory centres and thence to the ideational centres; but they urge that under some conditions the current can flow back from the ideational centres to the sensory ones, thereby producing the images or hallucinations. Other authorities say that any such back-flow of nervous current is contrary to the teachings of physiology, and they try to explain the hallucinations by disorders either of the sense organs or of the sensory centres; the ideational centres, they declare, do not enter into the matter at all. Yet others think to solve the Gordian knot by denying the whole distinction between the centres of two sorts.

For our present purposes, however, this psycho-physiological problem may be waived. Our main conclusion is that the power of the human mind to create new content—by transferring relations and thereby generating new "correlates"—extends its sphere not only to representation in ideas, but also to fully sensuous presentations, such as are given in the ordinary seeing, hearing, touching, and the like, of every one of us.

CHAPTER XI

THE GREATEST CREATION OF ALL

¶ 1. MENACE TO COMMON SENSE. Our last conclusion is an alarming one. It raises a threat against that upon which "the plain man" pins all his faith; that is, the testimony of his senses. If he is not to trust *these* any longer, the world is indeed out of joint. Let us then be very careful in our reasoning and err, if any way, on the conservative side.

What after all is the head and front of our finding? It is that in a great variety of circumstances—which could be extended much further still—we have sensory perceptions which are just as clear and hard as those of ordinary life and yet which eventually turn out to be devoid of foundation. Certainly this does not prove that these ordinary perceptions must necessarily also be unfounded; but it does show that they *may* be so; we are compelled to admit that they stand in need of supporting evidence.

Where, then, is such further evidence to be found? As one possible source, we may have recourse to physiology. But here we seem to tumble out of the frying pan into the fire. For physiology teaches that the nature of the action of a sensory nerve depends wholly on this itself and not at all on the nature of the stimulus exciting it. For example, a visual sensation remains such whether its nerve be stimulated by visual rays, or by electricity, or even by pressure. Similarly, as regards the nerves for sound, touch, warmth, cold, taste, smell, etc. The effect of stimulation remains in

each case always the same, regardless of the nature of the stimulus.

This leads to the paradoxical result that one and the same stimulus can produce quite different sensations according to the nerve on which it happens to impinge. The same electromagnetic waves, which when falling on the retina produce sensations of light, will when falling on the skin produce those of warmth. If we could sever both the visual and the auditory nerves of a man and then join the peripheral part of each to the central part of the other, he would undoubtedly see people's voices and hear their faces!

And what is here said about the quality of sensations may be repeated about their spatial character. For this, too, would seem to be wholly determined by the group of nerves excited, and not by the nature or even place of what excites them. Startling proofs of this fact can easily be produced in the psychological laboratory. But for present purposes it is enough to quote the well known paradox that, after a man has lost say his right arm, a stimulation of the stump may still be perceived as taking place in his right hand, although this no longer exists.

Yet another great source of evidence about the truth of sensory perception lies at our disposal: the witness of physical science. But here, if possible, matters turn out to be worse than ever. For the very first great advance made by the physicists—the one which took them out of the slough of despond in which they had lain throughout the Dark and Middle Ages—was to *discard sensory quality* as *not* being any character of the material world that concerned them. They now reduced

the external world to the sole terms of force, space and time. Before long, however, force too had to be given up by them; their finest observations failed to detect any signs of it in the world of matter. And quite recently, even space and time have had to be renounced also. What sort of a universe does all this leave? One with no colour, no light or shade, and no sound; one that cannot be touched, smelt or tasted; one that is not even in space or in time. Compare this with the universe of common sense, where the sun shines bright, the flowers are many coloured, the birds warble in the air, our friends talk to us, contacts with material objects give pleasant, or maybe unpleasant, sensations of touch. Surely, if the version of the universe given by science is anything like adequate, then the perceptions of common sense must be hallucinatory and false to the last degree.

¶ 2. DOCTRINE OF "AS IF." There is still another source of evidence to be considered. It is that supplied by genetic psychology. For hitherto we have only taken into account sensory percepts as they are when in full bloom. Additional light on their structure may reasonably be expected from examining how they grow.

Working backwards in this fashion, we can easily enough find an upper stratum of comparatively late origin. This may be illustrated by the following figure, which can either appear as a pretty young girl or else as a severe looking elderly one (Plate XVI). Almost unquestionably, all that differentiates the one appearance from the other must, since both come from the same stimulation of the senses, have

arisen in the course of experience. Conversely, what is common to the two appearances—little more than the mere distribution of light and shade—must be of older date and have intimate connections with the sensory stimuli.

Plate XVI

A still more primitive mental stratum can be, and has been, reached in various ways. One is by means of distraction; a study has been made of what perception is reduced to, when the perceiver is intent on other things. A second way is where the perceiver—having acquired the art by practice—looks at an object with the least possible mental activity.[1]

A third method cultivated by Bichowsky, Dickinson, and

[1] For an account given of these experiments by the present author, see *The Nature of Intelligence*, Macmillan, 2nd ed., 1927, ch. XIV.

especially by Cattell under the supervision of Aveling, consists in learning to introspect the first effect of an abruptly commencing sensory stimulus.[1]

Yet a fourth method has eliminated the superstructure of a percept by a clever use of what is known in psychology as "specific fatigue". All these methods have verified each other by leading to just the same result. We seem forced to believe that the earliest and most primitive effect of a sensory stimulus—even of visual kind—is not any kind of knowing at all, but only a feeling.

In what manner or fashion, then, has this primordial feeling ever developed into anything like our ordinary sense perceptions? The answer to this question is given—solely, I believe—by the same noegenetic principles which have served us all along. First comes the first principle, that of knowing one's own experience, which converts the feelings into consciousness of feelings. The second principle brings to light the essential relations involved.[2] Whilst the third principle builds up a supplement of "correlates". In the end there evolve such composite percepts as those of the young girl and the old woman (see p. 144). Further additions are made by way of reproduction. How this all happens has been shown in detail elsewhere.[3] For the most part, everything is as plain as could be desired.

[1] Cf. R. B. Cattell, "The Subjective Character of Cognition", *Brit. J. Psychol., Mon. Suppl.*, 1930.

[2] For the best account of this operation, *cf.* Line, "The Growth of Visual Perception in Children", about to appear in the *Brit. J. of Psychol., Mon. Suppl.*

[3] Cf. ch. xv of the work quoted on p. 26.

There are, however, certain points which are of peculiar importance and difficulty. The first is about space. Since position, or "local sign", is one of the four primordial characters of sensation, we can easily see how a man comes to perceive his own body as spatial. But how does he arrive at perceiving, or even at thinking about, a space external to his body? I would suggest as follows. Suppose that *a* and *b* represent any two points in or on his body.

*a*_____*b*.....*c*

For the mind to transcend this body, nothing is needed save that the spatial extension which relates *a* to *b* should be transferred so as to extend from *b* in the direction of *c*. In this fashion the spatial character is "projected", as it has been called. That the mind really has such power of projection from inside to outside is supported by numerous observations. Conspicuous in this respect is the sense of vision; a speck really within the eye may have the appearance of being at any distance away, from a few inches up to many miles.

More serious might be thought the difficulty of explaining in this way our perception of force. Objects in the external world appear to be pushing and pulling one another about. How do they get this appearance? To this may be replied that at any rate it *is* an appearance and nothing more. From Descartes, Malebranche and Hume onwards, no serious thinker has ever believed that our senses give us any genuine direct knowledge of external force. Only through ignorance of this psychological and philosophical work, it would

seem, have, as mentioned, a few physicists endeavoured to re-introduce it. The notion of force, then, must be taken to have originated subjectively. The only question is as to whether this subjective origin is reducible to our three principles, or instead stands out as some extraordinary feat that goes beyond them. To adopt the latter alternative would seem to be quite superfluous. The most reliable introspection hitherto achieved in psychological laboratories is unanimous in reporting that we are conscious of *ourselves* as exerting some kind of force. This relative character is, then, attained originally within ourselves by way of the first principle. Nothing prevents us from thereafter transferring it elsewhere by way of the third principle; the character of force, just like those of space and of colour, can quite well be "projected" by us. As to why all this projection occurs systematically and not chaotically, an explanation has been adventured by the present writer in an earlier work.[1]

In short, then, the whole universe, as every one of us ordinarily perceives it, is but one more—and surely the greatest—of our mental creations. In building it up, all three principles have been busily at work. But the final and most essentially creative part is played by the third, with its educing of "correlates".

Here, however, grave doubts may arise. If the "sensible" universe that we see with our eyes, hear with our ears, and touch with our fingers—if this be in the condition here described—what shall we say of the so-called "intelligible" universe; that which is built up by taking much thought;

[1] "An 'Economic' Theory of Spatial Perception", *Mind*, XVI, No. 5.

that which has been excogitated by the wise men of all places and times; that for which Plato wrestled and Aristotle sweated; that which Descartes conceived so super-clearly and Spinoza so super-smoothly; the bucket, as it were, in which Kant so cleverly stood and lifted himself up by the handles; the empty hat out of which Hegel handed rabbit after rabbit; the topic about which so many have taught what they knew they did not know; about which every one of us can discuss so pleasantly in our hour of expansiveness? All this likewise, it would seem, is just the product of putting relations where they have not been found.

But these are mere hints. If any one would have the matter profoundly reasoned out, if he would escape shipwreck on the rocks of scepticism or of solipsism; if he craves for the haven of real reality—then he must be referred elsewhere.[1]

[1] *Cf.* especially the work of Aveling, *The Psychological Approach to Reality*, University of London Press, 1929.

EPILOGUE

Our tale is told. May it not run counter to the bent of enthusiasts! We would be friends with them; but a greater friend is Truth. If, as will almost certainly occur, this explaining of one of the three supposed inexplicables—goodness, truth, and beauty—should arouse the angriest attacks of critics, to them I can only say as another once said, Strike me, but Hear me! The road of science lies covered with poetic wonders which its car has driven over and crushed. And so it must ever be. In the long run the loss may yet prove a gain. For all the time that science is destroying lesser marvels it is itself becoming more supremely marvellous, and more truly poetic too.

But whether or not liked in themselves, the facts marshalled on the preceding pages may still be turned to actual profit. If any one is dissatisfied with his own appreciation of works of art, or with his insight into the divinations of science, or with his understanding how behaviour is adapted to environment, or his comprehension why things are unlike what they seem, or his penetration into the secret of glib philosophising, in any such case he may possibly—as the present writer has done—find not a little help in the considerations here set forth.

If, still more practically minded, he wishes to know how the power to create varies from one individual to another, how it can be developed, and how measured—whether for the purposes of education, medicine, industry, or anything

else—then the present analysis (together with its experimental developments given in the relevant literature) may yield an unexpected reward.

Still more hopefully may another advantage be anticipated. Our topic has been limited to creativity, but our explanations have rested on the general principles of psychology. This would seem to imply that the study of creativity and that of general psychology are at bottom the same. Likely enough, then, he who has not mastered the one will hardly go far aright in the other.

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